MACHINE TOOL

Blue Book

DECEMBER 1941

ARDINGE BROTHERS, Inc. ··· ELMIRA, N. Y.

Photograph courtesy Packard Motor Car Co.

A MARVEL No. 8 Speeds All-out Production of Packard Rolls-Royce Aircraft Engines

MARVEL Sawing Machines are playing an important part in speeding production for National Defense. Not only the MARVEL 6A and 9A High-Speed Production Saws that automatically cut-off rifle barrels, gears and parts from bar stock in great quantities; or the giant MARVEL No. 18 Hydraulic Saw so well known for its cutting Speed; but all other MARVEL Saws, too, each in its own way, are at work in America's "all-out production." Take for example, the MARVEL No. 8 Universal Band Saw illustrated above, working on aircraft engine crankcases in the "D" Division of the new Packard Rolls-Royce Engine Plant.

Because of its large capacity (will handle work up to 18"x18") because its cuts at any angle from 45° right to 45° left; and because the blade remains vertical throughout its straight-forward carriage travel, the MARVEL No. 8 will do trimming, notching, mitering and cutting-off, and will save hours of machining by roughing out work to size and shape.

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Eastern Sales Offices: 225 Lafayette St., New York

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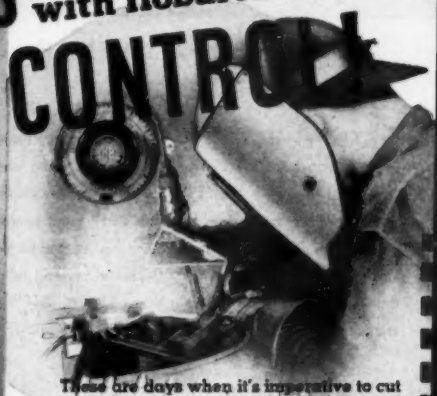

These are days when it's imperative to cut corners in every possible way while maintaining the high quality called for by inspectors on defense work.

Saves Time It's unnecessary for welding operators to run back and forth between work and welding machine to make ordinary heat adjustments.

Saves Materials When it's so easy for the operator to use exactly the right heat adjustment for each operation, you may be sure that there will be fewer inspection rejections.

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- 6" Capacity with Step Ch
- 1" Capacity with Draw-in C
  or
- 1" Capacity with Push-out C
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BE MODERN...equip your machines with SJOGREN SPEED COLLET CHUCKS

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A Sjogren Speed Collet Chuck gives greater capacity, saves time, increases accuracy and assures better results.

It is readily adapted for use on the spindle nose of your lathes, takes precision collets — enabling the operator to do better work . . . . faster!

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ELMIRA, N. Y.

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Save your high speed steel for use in ARMSTRONG TOOL HOLDERS

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ARMSTRONG TOOL HOLDERS Are Used in Over 90% of the Machine Shops and Tool Rooms

Machine Tool Blue Book

Hitchcock Publishing Co., 508 So. Dearborn St., Chicago

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DECEMBER 1941

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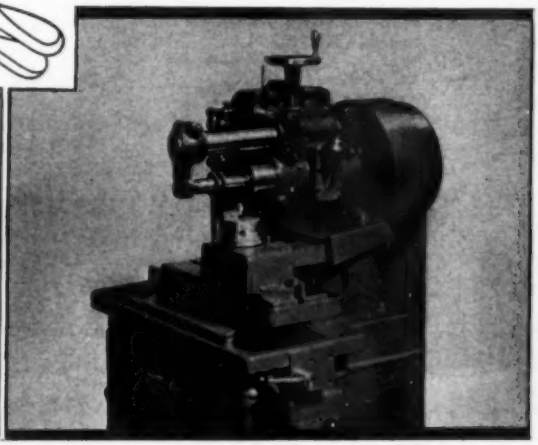

Here is a milling machine designed to meet the expanding requirements of the aircraft industry—fully automatic in operation—precision built to turn out precision work—low changeover time.

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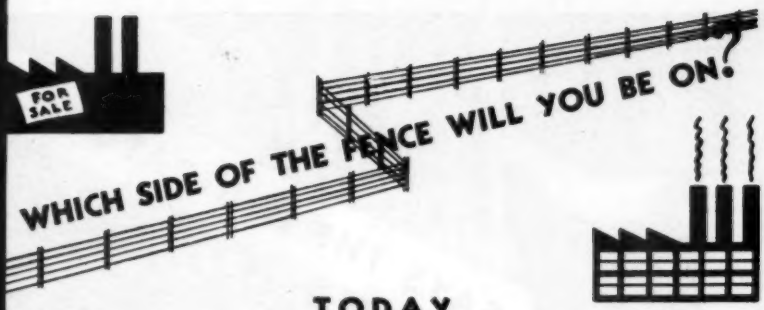

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Post-war competition will relentlessly eliminate any plant whose equipment cannot easily turn to low cost production for peace-time demand. Wise purchases of Jones & Lamson equipment, made today, will leave you on the right side of the fence.

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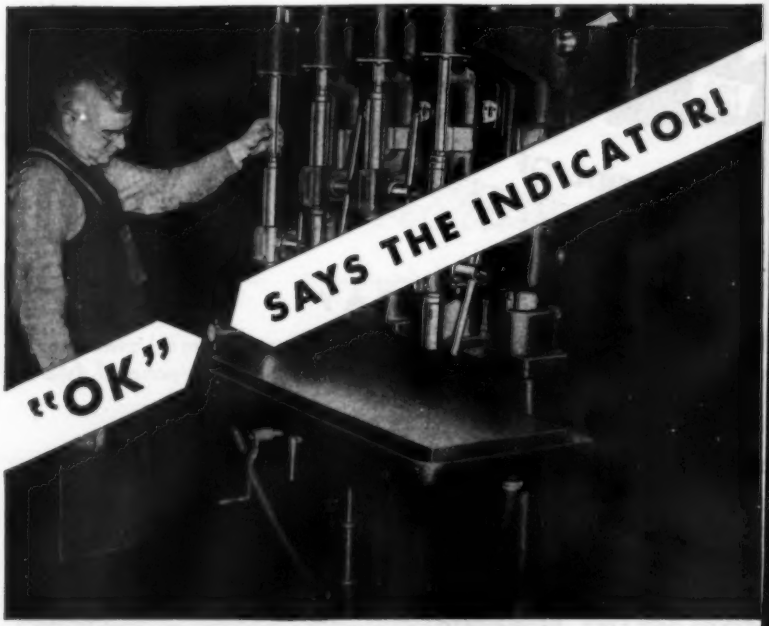

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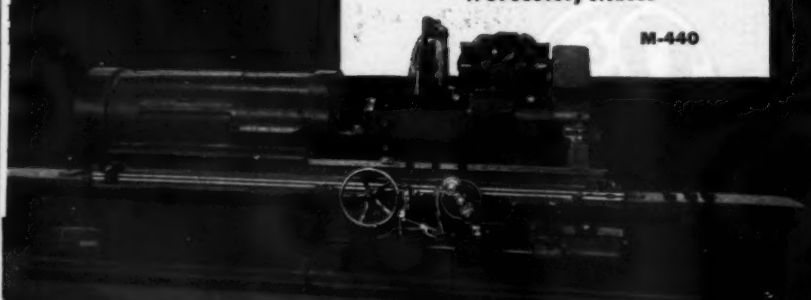
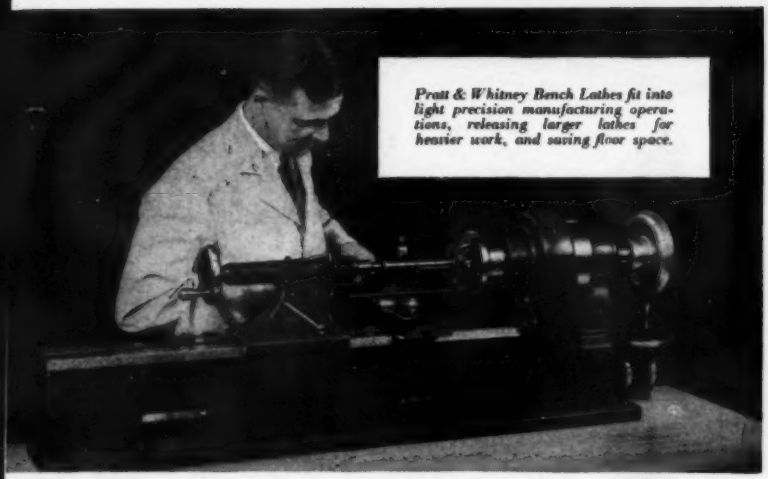
M-440



PRATT & WHITNEY

Instrument maker at work . . . depending on the precision of his P&W Bench Lathe . . . typical Toolroom procedure for making accurate parts for tools, jigs and fixtures vital to national defense.



Pratt & Whitney Bench Lathes fit into light precision manufacturing operations, releasing larger lathes for heavier work, and saving floor space.

Compact . . Powerful . . Rigid . . Accurate

These Model "C" Pratt & Whitney Bench Lathes . . . smoothly powerful in operation . . . are equally adapted either to toolroom precision requirements or to light accurate production line jobs. They have the stamina and inbred precision for 24-hour-a-day schedules . . . dependably efficient. Their use frees larger costlier machines for heavier work.

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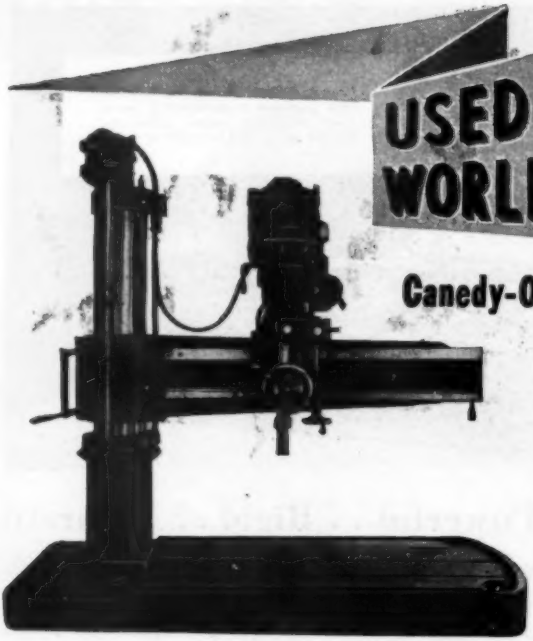

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	9" Column 3' Arm	11" Column 4' Arm	11" Column 5' Arm
Drills to the center of circle on base or table	73½"	96"	120"
Length of arm	3"	4"	5"
Greatest distance from spindle to base	43½"	48"	48"
Minimum distance from spindle to base	9½"	15"	17"
Minimum distance from spindle to column	10½"	10"	10"
Traverse of spindle	9½"	9½"	9½"
Hole in spindle—Morse Taper	No. 4	No. 4	No. 4
Diameter of spindle at nose	2½"	2½"	2½"
Traverse of head on arm	25½"	36½"	48½"
Traverse of arm on column	21½"	24"	22"
Spindle speeds with 1200 RPM motor	(60, 85, 130, 180, (425, 560, 860, (1200 RPM		on all models
Spindle speeds with 1800 RPM motor	(85, 130, 180, 274, (560, 860, 1160, (1750 RPM		on all models
Feeds per revolution of spindle	(.004" .007" (.010" .020"		on all models
Bearing of arm on column	14"	18"	18"
Size of main driving motor	2 HP.	2 HP.	2 HP.
Height of drill column over gears	89"	98"	98"
Working Surface of Base	29"x45"	36"x60"	36"x88"
Net weight	4000 lbs.	6200 lbs.	7000 lbs.

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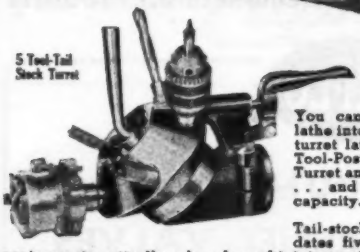
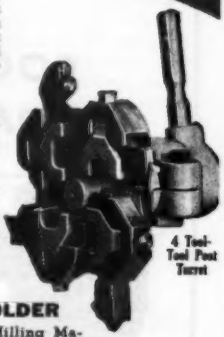


5 Tool-Tail Stock Turret

You can change any engine lathe into a complete, precision turret lathe with the Jefferson Tool-Post Turret, Tail-Stock Turret and adjustable Pull Feed . . . and double its productive capacity.

Tail-stock Turret accommodates five tools and each tool centers automatically when brought into position by means of an indexing plunger. Made in four sizes to fit small bench lathes up to lathes with 20" swing.



4 Tool-Tool Post Turret

Tool-Post Turret carries four separate tools instead of one. Made in two sizes for standard 0, 00, No. 1 and No. 2 tool holders.

Adjustable Pull Feed eliminates slow movement of tail-stock spindle and provides easy control. For any lathe up to 18" swing.

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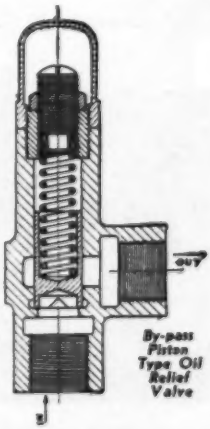

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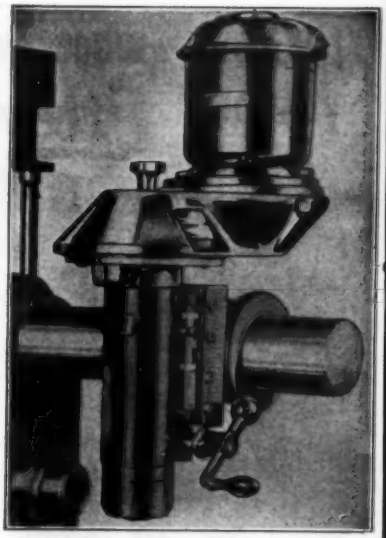

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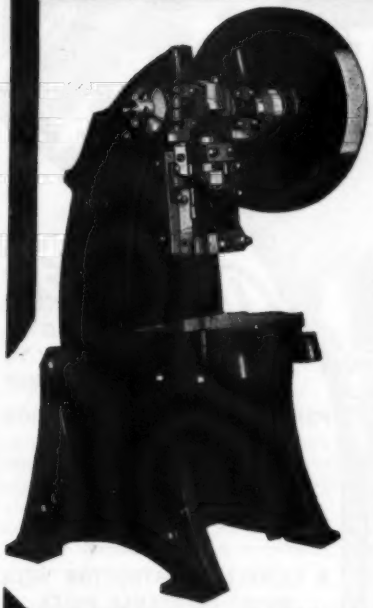

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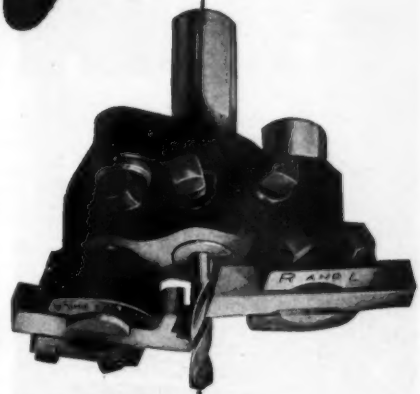

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Speed is the keynote of this vast defense production schedule. This Turning Tool increases production by reducing set-up time, by speeding up cutting, by doing right and left hand turning (it requires only ten seconds to change from a right to a left hand turning tool), and by performing several operations simultaneously.

A savings of over $200 is realized on the initial cost alone. R and L costs less than one-fourth of the tool which it replaces (14 in all). And, because they are simply and ruggedly built, they retain their accuracy, thereby saving maintenance costs. It does away with the reconditioning of extra tools when worn, or replacing when lost.

Write for booklet describing this and Tap and Die Holder, Roller Backrest and Universal Tool Post.

R and L Tools

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BEATTY—300 TO 700 Tons High Speed Self - Contained HYDRAULIC PRESSES

This new line of rugged BEATTY Presses offers capacities of from 300 to 700 tons. Within reasonable limits, the stroke, distance between columns and sizes of platens can be made to suit your requirements.

There are many advanced modern features such as the sturdy welded construction of base and top crown which are heavily reinforced for rigidity. Ram is also of welded construction, heavily ribbed and reinforced for rigidity.

For purposes of illustration, specifications are given for a typical 600-ton press. While the stroke is 49", the press is equipped with automatic stroke control on the up stroke and may be operated on a short stroke most suitable for the work to be performed, thus reducing the period required for advance to the work and return from the work.

GENERAL SPECIFICATIONS:			
Capacity in tons	600	Distance between columns, r. to l.	84"
Stroke	49"	Distance between columns, f. to b.	84"
Maximum opening, stroke up	60"	Platen size, r. to l.	108"
		Platen size, f. to b.	84"

Motor required for operating knock-out cylinder, 2 h. p., 1160 r. p. m. Either of two pumping units may be supplied for operating press. One of these uses a 30 h. p., 860 r. p. m. motor. The other uses a 60 h. p. motor and permits higher pressing speeds.

Tell us your requirements and let us submit detailed recommendations.

BEATTY MACHINE & MANUFACTURING CO.
HAMMOND, INDIANA

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STEP UP PRODUCTION 35% to 300% in 1942 . . . A COMPLETE LINE For Motorizing All Machine Tools

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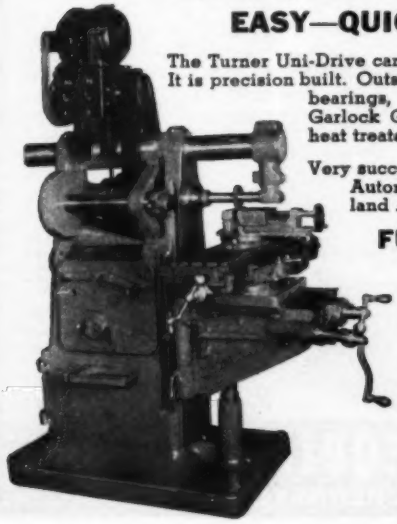

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Very successfully used on Brown & Sharpe Automatic Screw Machines and Cleveland Automatic Screw Machines.

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Turner Uni-Drives are fully guaranteed for one year and are subject to return for full credit within 60 days if not satisfactory. See the Turner Uni-Drive at once. Your local dealer will gladly give you full details. If you cannot locate your nearest dealer write for information and prices.

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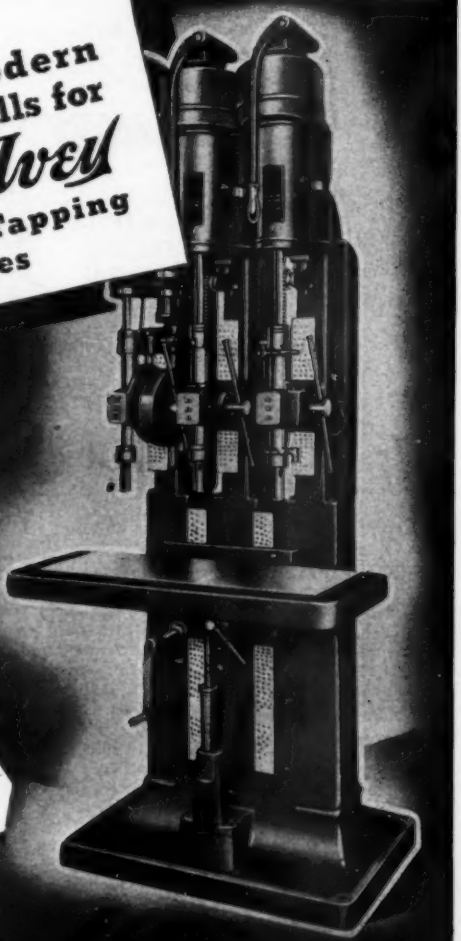

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- Highest quality in materials and workmanship for dependable, continuous, long life service
- Modern in every detail of design, capacity and construction
- Various types . . . 6 or 8 spindle speeds . . . for ordinary or high speeds
- Two speed motor with three mechanical changes
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STANLEY TOOLROOM GRINDER – can be used freehand or in milling machine, shaper, lathe. Handles external or internal grinding on dies, machine parts, spiral cutters, etc. Drives emery wheel up to 1½" x ½".

Check those jobs which are held up by slow delivery of big machines. Get your Stanley Distributor in! Invite him to show you how and where Stanley Electric Tools can speed up your production. To demonstrate how accurately and fast these tools can handle many of your time-consuming jobs.

He will show you Stanley Unisbears for cutting sheet materials. Stanley Grinders – Contour, Toolroom, Bench and heavy Portable types. Stanley Electric Hammers, Drills, Screw Drivers and Safety Saws. Every one of these tools will help you cut corners without costly delays. If you prefer, write for literature. Stanley Electric Tool Div., The Stanley Works, 141 Elm St., New Britain, Connecticut

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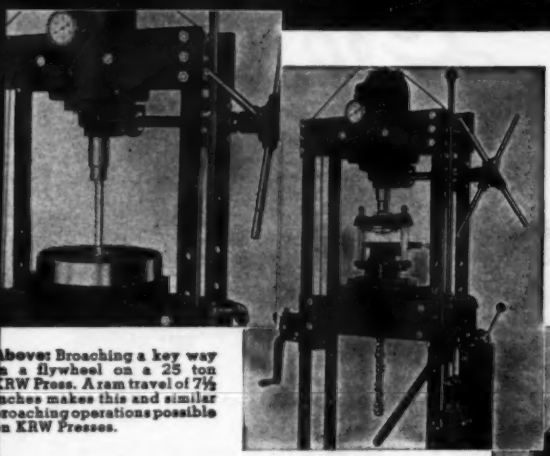
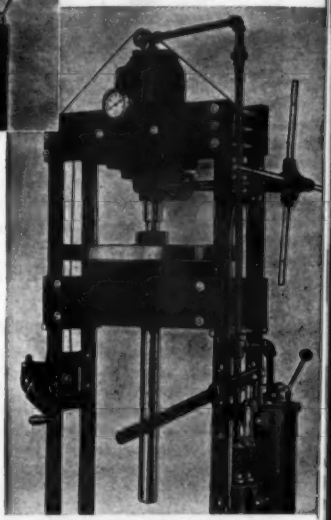
EVERY DAY FINDS NEW WAYS OF SAVING TIME AND LABOR WITH KRW HYDRAULIC PRESSES



Above: Broaching a key way in a flywheel on a 25 ton KRW Press. A ram travel of 7½ inches makes this and similar broaching operations possible on KRW Presses.

Left: Using a KRW Camshaft Timing Gear Fixture for replacing the timing gear on a Ford V-8 Camshaft. Special Fixtures such as this can be designed to give accuracy and speed to almost any operation, utilizing the KRW Press as the prime mover.

Below: Pressing "home" a long shaft in a flywheel. Bed can be adjusted to desired position quickly and easily.



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- 10" swing, 24" between centers
- Bed 6 15/16" wide by 43 1/8" long
- Prismatic V and flat ways, Hand scraped & honed
- New Departure Precision Pre-loaded Ball Bearing Headstock Spindle.
- Power Longitudinal and Cross Feeds
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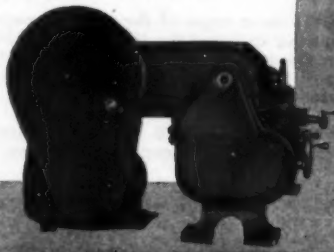
Patented Unit Counter Assembly

The countershaft assembly shown at the right is carried on a three point suspension and completely insulated by rubber at all contact points to prevent vibration being transmitted to the Lathe. All pulleys and belts are completely guarded, yet readily accessible when desired.



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TURRET MILLING MACHINE

Rigidity
Flexibility
Unparalleled
Range

The most difficult milling, drilling and boring jobs are easy with the new Bridgeport. Here are a few of the advanced modern features that make such performance possible:

Angular settings in one plane are achieved by turning the hand wheel which controls the keyed overarm. Turret diameter is 15" with 5" overarm.

Column, knee and table construction are rugged with wide ways and tapered gibs for accurate and vibrationless operation. Table, knee and saddle locks are located in front for easy accessibility.

Graduated dials are 3¾" in diameter. Anti-friction bearings are used throughout.

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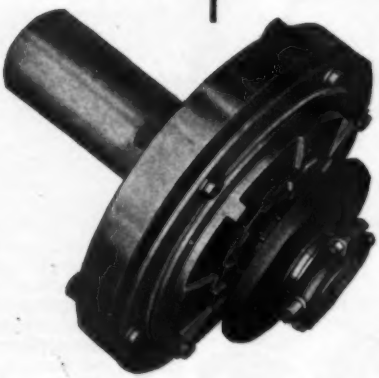
The CONWAY



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The start meets more shock
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The stop needs drag - free idling.

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CONSTANT HIGH SPEED
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Why let your MALL Flexible Shaft Grinder stand idle between grinding jobs, when you can easily keep it busy with MALL interchangeable tools and distribute the burden over 6 other tasks?

These swivel-fitted attachments are ruggedly constructed for long, dependable service. They are light in weight and easy to handle. They can be changed as easily and quickly as the bits in a brace—with minimum "down-time". And in addition, they can all be kept within arm's reach on the handy tool tray beneath the motor.

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If the present tool shortage is cramping your production, don't delay. Equip your MALL Flexible Shaft Grinder with these interchangeable tools TODAY.

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PRECISION

PLUS SPEED AND VERSATILITY

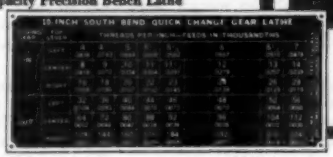
South Bend 10" Swing 1" Collet Capacity Precision Bench Lathe

Hand wheel draw-in collet chuck for precision tool room work. Maximum collet capacity 1".

Hand lever draw-in collet chuck for rapid production operations. Maximum collet capacity 1".

Above. Headstock end of lathe showing Quick Change Gear Box.

Left. Index chart showing threads, feeds available through Gear Box.



PRECISION is the first essential in modern metal working industries. But speed is necessary also, for the efficient use of fast-cutting carbide tools — and versatility, to reduce set-up time to a minimum. Precision, speed, and versatility are three of the many qualities responsible for the continually increasing popularity of South Bend Lathes.

The 10" Swing, 1" Collet Capacity Precision Bench Lathe shown here is engineered for the most exacting classes of close-tolerance machine work. Direct belt drive to the carefully balanced spindle assembly provides a series of smooth, vibration-free speeds ranging from 50 to 1357 R. P. M. The full quick change gear mechanism makes any of 48 different threads and 48 different feeds instantly available.

This combination of precision, speed and versatility assures an efficient output on tool room or manufacturing work — makes this lathe ideal for defense programs demanding top speed production. South Bend Lathes are made in 9", 10", 13", 14½", and 16" swing, manufacturing or tool room type, individual motor drive. Write for catalog and name of nearest dealer.

SOUTH BEND LATHE WORKS

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LATHE BUILDERS SINCE 1906

Editor's Page

"YOUR skill, efficiency and effort have earned for you an award which has always been prized in the Navy. To me it is particularly fitting and appropriate that the work you men are doing in the factories should be recognized by the same emblem or symbol with which excellence in gunnery in the fleet is rewarded.

"Today the Navy is recognizing the fact that you have been playing your part in the defense of democracy. This reward is concrete evidence of that recognition, and you may be sure that the men in the fleet will recognize and cheer you for it."

With these words, Admiral William Harrison Standley presented the U. S. Navy Bureau of Ordnance Flag and the Navy "E" Pennant to Monarch Machine Tool Company at Sidney, Ohio, November 11th. In addition, every employee received a handsome bronze button bearing the insignia of the Bureau of Ordnance with a superimposed "E."

The point is not that Monarch received this merited honor, for other machine tool plants have earned similar recognition. The staging of the impressive ceremony was noteworthy.

Navy men visit defense plants every day, sans the gold braid. Likewise the Army Officers. President Whipp wanted to bring his men closer to their Navy and their Army. At his suggestion, the Naval Officers, headed by the Admiral were in full uniform. High ranking Army Aviation Officers from Dayton were also present in uniform.

As builder of plant morale and enthusiasm—as a blight for any seeds of subversion, the value of such occasions is beyond estimate.

Wesley G. Paulson

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1/4 IN. CAPACITY — MODEL 45

NEW!

The Mightiest Mite of the Drill Field!

ONLY 6¾" OVERALL!

★ WEIGHS ONLY 2¾ LBS.

100% ANTI-FRICTION BEARING CONSTRUCTION

★Sells for only $32.50

IT packs a world of drilling speed and power in the palm of your hand—the new SKILDRILL is so small, so light, so compact, it gets into the tightest places . . . yet it's a bear-cat for work, wherever ¼-inch drilling is needed.

Take a SKILDRILL in your hand, look at its features, watch its performance and you'll want to have it handy in your plant—for precision production drilling, for installation or assembly work. Compact die-cast body, helical cut gears and 100% anti-friction bearing construction mean easy handling and smooth performance. Powerful Universal motor means fast drilling up to ¼ in. in steel, ½ in. in wood. SKILDRILL is a drill you should have . . . it's a drill you will want, once you see it in action. ALSO 21 OTHER POWERFUL MODELS.

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YOUR DISTRIBUTOR WILL GLADLY DEMONSTRATE THESE TOOLS ON YOUR WORK

Featured In This Issue

MILLION VOLT X-RAYS—The ability to look through solid masses of steel five or six inches, almost as easily as if they were glass—that's what this new equipment offers industry. By taking two X-Ray pictures at an angle, a stereoscopic view is obtained, revealing in three dimensions exact location and nature of any internal flaws. Story of the development and industrial uses begins on page 37.

MOLYBDENUM HIGH SPEED STEELS—Due to the shortage of Tungsten, there has been much interest in the substitution and use of Molybdenum Steels. Properties of the different Molybdenum alloys are discussed with suggestions as to heat treatment and hardening. See page 49

TURRET LATHE VERSATILITY illustrates and describes a few jobs handled to advantage on these useful machine tools. See page 65

AUTOMATIC SHELL FORGING describes the new equipment developed by Clearing Machine Corporation for shell production at the rate of 240 per hour. The machine and its operation are described in detail in the story beginning on page .....75.

GETTING THE MOST FROM MOTORS by Ernest W. Fair presents many helpful hints on the use and care of these hard-working drive units. Observance of these simple precautions may save time and trouble right now when every plant is trying to sustain production. Page 85

5 x 1 VERSUS 1 x 5 by Philip McKenna discusses feeds and speeds with carbide tools. He shows that fundamentally, using 1/5th the feed and five times the speed is not always equivalent to five times the feed and 1/5th the speed. See page .....93.

BLIND RIVETING is by Alex. Mullgardt, Chief Engineer, Cherry Rivet Co., Los Angeles, Cal. He discusses riveting in general and blind riveting in particular. See page .....99.

CARBIDE TOOLS ON SHORT RUNS shows that the "mass production" industries are not the only ones who can profit through "tipping" their own carbide tools. See page .....105.

PROFITS FROM SCRAP is by Al. Bernsohn. He emphasizes the important place scrap has now assumed as a result of the defense program. Instead of being something merely to be disposed of, scrap may now be converted into profits. Page .....111.

DEFENSE SUPPLIES RATING PLAN by Dillon Stevens, covers the staple defense supplies, such as hand tools, which must be manufactured before they are ordered, as contrasted with planes, guns, etc. See page 121.

"LET'S TALK SHOP" presents a collection of items of general shop interest —Special Carbide Tools from Standard Shapes, a Handy Carrier for Carbide Tools, a Morse Cone Adapter, a couple of heat treating hints and a suggestion for eliminating cutter marks. Page 123.

WHAT'S NEW includes pictures and descriptions of the latest offerings in production equipment. Page.....145.

SUB-CONTRACTS — Listing additional plants now available for subcontract defense work pages 180-1

SPECIAL SWING FRAME GRINDER, fabricated by welding is described by John S. Green. See page.....182

EXPERIENCES WITH ROCKER BEAM DESIGN by Joseph Kuchar, describes the evolution of a satisfactory design through the adoption of arc welding. Page 185

SAVING ALLOY SCRAP highlights the importance of segregating and conserving valuable alloy scrap during the present emergency. Page 190

WORDS *that quickly turn to* STEEL

SUBMIT your steel requirements to this experienced, highly-specialized source. Telephone, wire, or write—however you communicate, you'll get action and effective co-operation.

If you phone, experienced operators connect you, *without waiting*, with a Ryerson steel man, a man who talks *your language*. Wires are received by teletype, direct from central telegraph offices. Mail is picked up hourly at the post office, *a faster service* than special delivery.

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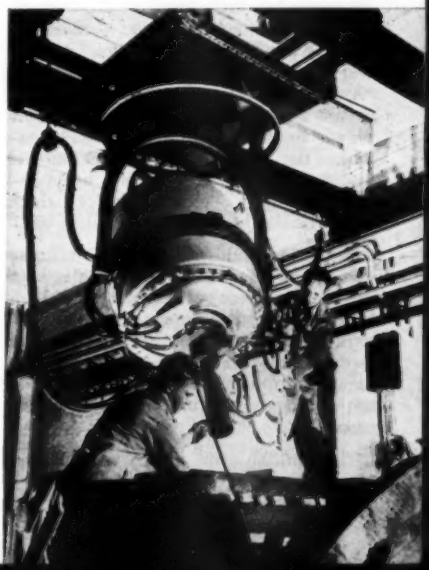
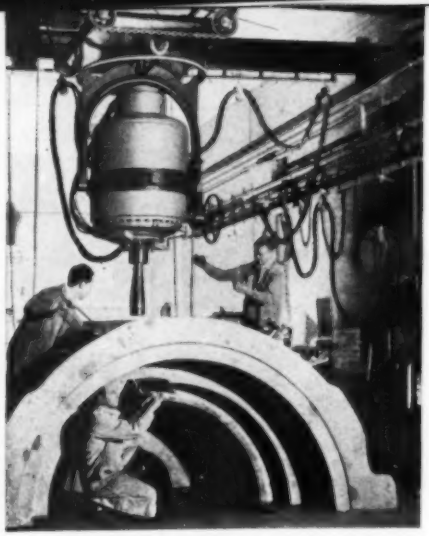
Industrial Applications of Million-Volt X-Rays

MILLION-volt x-rays, until recently obtainable only with elaborate equipment and used only in a few hospitals, have now put on "overalls." They are speeding America's defense efforts in four great factories, it was announced at a recent industrial x-ray symposium at the General Electric Co., Schenectady. Babcock & Wilcox, Combustion Engineering, Ford Motor and General Electric all have such high-power equipment for inspecting castings, thick welds and numerous other heavy items. Most impressive results have been obtained, the visitors were told by representatives of the different companies. Additional million-volt outfits will soon be in use in still other plants, it was announced. These will be at the American Steel Foundries, the Norfolk and Philadelphia Navy Yards, and at the Campbell Wyant and Cannon Foundry Co.

The story of million-volt x-rays, their applications, and possibilities, was told jointly at the symposium by Dr. E. E. Charlton and W. F. Westendorp of the G-E Research Laboratory, who described the construction of the equipment; C. D. Moriarty of the G-E Works Laboratory, who explained the application of million-volt x-rays in the examination of large castings; by O. R. Carpenter of Babcock & Wilcox and by A. J. Moses of Combustion Engineering, describing the application of 1,000,000-volt x-rays in inspecting boiler drums and pressure vessels, and comparing million-volt and 400,000-volt x-rays and radium use; Donald McCutcheon of Ford Motor Co., emphasizing crankshaft and aluminum investigations; and E. W. Page of the General Electric X-Ray Corp. who pointed out some of the other industrial applications of x-rays. Dr. W. D. Coolidge, director of the G-E Research Laboratory, W. L. Merrill, engineer of



Positioning the million-volt industrial X-Ray equipment for radiographing a large casting.



It will soon be known if there are hidden flaws in this huge casting. One man is positioning the film—the second is checking the mounting height of the tube—the third is directing positioning of the equipment.

the Schenectady Works Laboratory, and W. S. Kendrick, vice president of the G-E X-Ray Corp., also appeared. In addition to hearing the talks, the visitors were also shown the million-volt equipment in use.

Through Six-inch Steel

"We can look through a block of steel five or six inches thick as if it were glass," Dr. Charlton declared. "And by taking two X-ray pictures, at an angle, we obtain a stereoscopic view. In this way it is possible to examine the walls of a large casting and see, in three dimensions, the exact location of any possible defect which might cause the machine to fail in use."

Extensive industrial use of million-volt x-rays has become possible with the development of equipment which is, relatively, as compact as a dentist's x-ray apparatus. The newest model of the million-volt x-ray unit is easily handled in a plant where 40- or 50-ton castings are swung around on great cranes.

The million-volt outfit will photograph through 5" steel in two minutes, Dr. Charlton explained. A 400,000-volt tube, the next size smaller, requires 3½ hours to do it, and does not show nearly as much detail through the thicker sections. Thus the new apparatus speeds inspection of parts for vital defense machinery. It is being used regularly in Schenectady to test large castings.

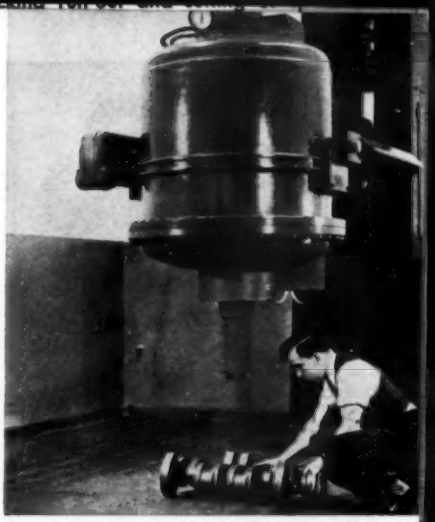
The first industrial application of million-volt x-rays was accomplished last December, with one of the outfits developed for medical purposes. It weighed two tons, and the equipment was enclosed in a steel tank seven feet long and four feet in diameter. In use it had to be connected to a powerful vacuum pump, which kept the x-ray tube itself exhausted of gas.

In contrast, the new apparatus is lighter, smaller, and simpler to use. The tank is three feet in diameter and four feet long. The weight is 1500 pounds. No external pumps are required, for the tube is maintained permanently at the required vacuum. Freon gas is contained in the tank for electric insulation.

Coreless Transformer Saves Space

W. E. Westendorp described the resonance transformer which is a chief factor in making such compactness possible.

Ordinary transformers, used for changing voltage either up or down, consist of two coils of wire, wound on an iron core. In the new "resonance" transformer, no iron core is needed. This is because the secondary, the coils of wire from which the high voltage



Positioning crankshaft for a radiographic picture with the million-volt X-Ray equipment in use at the Ford Motor Company. No longer is it necessary to guess as to the internal structure of large metal bodies.

comes, has several hundred thousand turns, giving it great inductance. It thus tunes normally to alternating current which oscillates 180 times a second, three times the frequency of the 60-cycle a. c. used for home lighting. Four kilowatts of electric power operate the outfit.

Without the iron core in the center of the coils, it is possible to place the x-ray tube in this position, which is an advantageous one, Mr. Westendorp explained. Only short connections are required and the transformer shields the tube from electric disturbances.

Twelve-section Tube

The x-ray tube has 12 sections. Electrons to produce the rays emanate from a heated filament at the top. As they pass through each section, a voltage of about 84,000 is applied, giving them an added push. By the time they reach the bottom they have been boosted by a total voltage of a million. Then they hit a tungsten target, in an extension of the tube which projects from the bottom of the tank, and x-rays result.

Unlike the small tube of the doctor's office, where the x-rays come off at right angles to the electron beam, most of the million volt rays pass through the target and emerge in the direction in which the tube is pointed.

Consequently, in most industrial uses, the tube, and the tank with it, is aimed like a gun at the casting to be examined, and the film is fastened to the other side. When more convenient, however, pictures may be made with the rays that come off to the side.

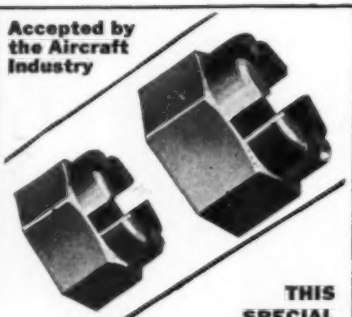
Economies of Million-volt X-rays

It is the economy of the million-volt x-ray equipment, as compared with smaller units, that permits routine examination of steel castings, said C. D. Moriarty, in charge of the equipment.

For some years, he said, factories have made routine examination by x-rays of welded parts to test their quality but, in the case of steel castings, would only inspect a few samples. The reason he said, has been that the weld involved only one to five per cent of the total volume of the metal to be x-rayed, whereas examining a casting means radiographing practically the entire volume.

However, x-ray inspection of castings can be done economically with the million-volt tube, which, on flat areas, permits 64 times the volume of metal to be examined per man-hour. This is because the big tube can be placed far back from the job, and a large area sprayed with x-rays at once, Mr. Moriarty declared. A large film in back of the casting will record the entire area in one shot. With lower power, the tube must be placed much closer to obtain the desired intensity. Thus a

Accepted by the Aircraft Industry



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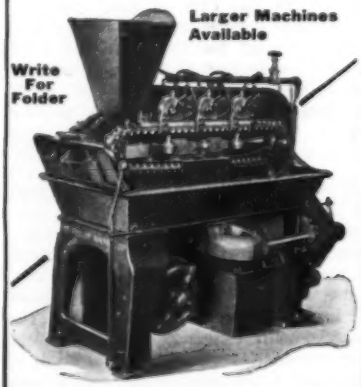

PELLOW MACHINE CO.
13510 Foley Ave., Detroit, Mich.

smaller area is covered, and a number of time-consuming separate exposures on small films must be made.

For a typical casting, he stated, 10 to 20 exposures are made, during which 50 to 100 radiographs of various sizes have been obtained. These are then carefully checked, and compared with photographs of the casting.

"When all interested parties are satisfied, the radiographs showing defective areas that require chipping, are sent to the chippers along with the casting," Mr. Moriarty explained. "The chipper places the radiograph in an illuminator nearby and digs into the casting, in the region where the radiograph shows there are defects. It is amusing to watch the face of an uninitiated chipper when he is told where to chip, how far below the surface to go, and what he will find when he gets there. His look of patient resignation turns to something akin to awe, with that 'What won't they think of next?' look."

When the chipping is completed, the holes are filled by welding and the casting is again x-rayed in the major repaired regions. After the casting is finally released the radiographs and other records are filed.

Time Saved in Ford Plant

The saving of time and labor, while yet obtaining better radiographs with million-volt x-rays, was emphasized by Donald M. McCutcheon, of the Chemical and Metallurgical Department of the Ford Motor Co. The equipment in that laboratory, he announced, consisted of units which "produce useful x-radiation with applied voltages of from 5,000 to one million."

In examining cast steel crankshafts for 2000-h.p. aircraft engines, use of the 400-kilovolt unit with the usual precautions to eliminate scattered x-rays required six times as many man-hours as found necessary with the million-volt outfit.

(Above) — 12-inch Nicholson Mill Bastard used to remove heavy burr raised in drilling set-screw hole. Also used on cut-off operations (right).

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THERE must be no compromise with maximum effectiveness in your Uncle Samuel's defense equipment . . . no faulty weapons—no faulty shells. There must be good tools to support the skill of the hands that make them. Here are four hand-filing operations in a munitions plant manufacturing 3-inch anti-aircraft shells. The files are Nicholson.

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(Below) Filing burr off rotating band seat with a 10-inch Nicholson Mill Bastard.

(Below) Removing slivers from machined rotating band with a 12-inch Nicholson Knife File.

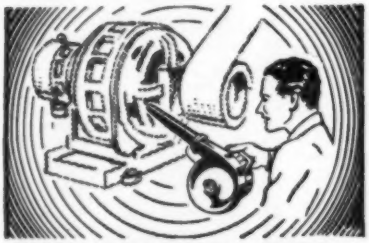
Also, he said, tests conducted on a heavy part for a large bombing plane required six exposures per casting with the 400,000-volt unit, while the million-volt tube can x-ray six castings with only one exposure.

The million-volt radiographs, Mr. McCutcheon declared, are superior to those produced with the lower power, because the tube is at a greater distance from the work and this reduces scattered rays which tend to blur the result.

War Accelerates Industrial Uses

Industrial uses of x-rays will be greatly accelerated by the war, just as the first world war speeded their application in medicine, declared W. S. Kendrick, vice president of the General Electric X-Ray Corp.

Though the discovery of x-rays came in 1895, and they were used in a crude way during the Spanish-American War, their medical application was still limited as late as 1914.



"Medical radiology far out-stripped industry following the last war because medical men had been forced to learn," he declared. "Now, with a gigantic production program giving impetus to the employment of x-rays not only for the examination of metals, but in a variety of other ways as well, perhaps industrial radiology will soon approach the stage of acceptance now enjoyed by medical x-rays."

Equals More Than Three Ounces of Radium

If it were possible to obtain and to use 100 grams (about 3.2 ounces) of radium worth about $2,500,000, radiographs might be made as quickly as with the million-volt x-ray tube, said O. R. Carpenter, of Babcock & Wilcox Co. The radium gives off gamma rays, which are similar to the x-rays, but of shorter wave-length.

Though radium can be carried around easily, and does not require the special electrical connections of the X-ray tube, the contrast of the resulting films, except in the thickest specimens of metal, is not so good as with X-rays.

"This means," continued Mr. Carpenter, "that while the image of a defect may be present in the gamma ray radiograph, more effort is required on one's part to see it than would be needed on a similar X-ray film."

Million-volt X-rays eliminate the need for over-reaching the most ef-

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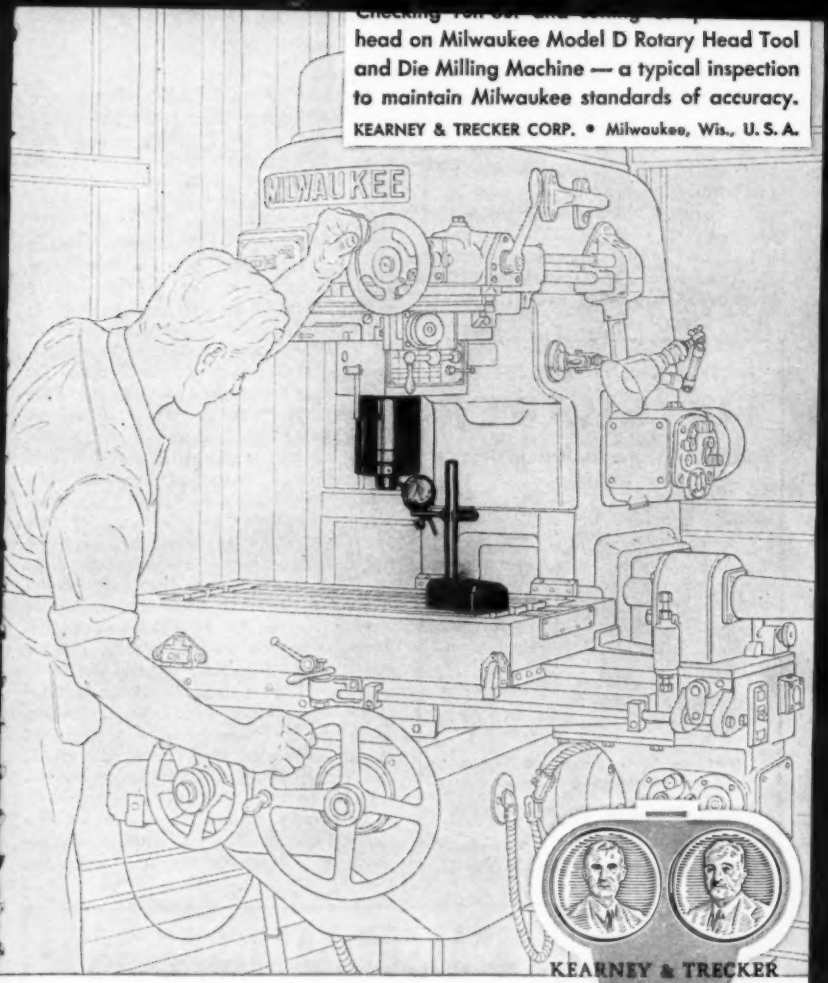

head on Milwaukee Model D Rotary Head Tool and Die Milling Machine — a typical inspection to maintain Milwaukee standards of accuracy.

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ficient capabilities of the smaller outfits, he said.

"It is recognized," he stated, "that good x-ray technique is neither too short an exposure at excessively high voltage nor too long an exposure at a voltage giving X-rays which will just penetrate the material. The examination of a 5" thick plate with 400,000-volt X-rays falls into this classification. We now have a wide range of X-ray equipment operating at peak voltages of from 200,000 to 1,000,000. No longer is it necessary to over-reach the penetration ranges of this equipment, but each may be applied to a particular thickness range with certain radiographic advantages."

Welding Investigations Bettered

"The development and improvement of industrial x-ray apparatus has been a major factor in the progress made in the manufacture of fusion welded, heavy wall, pressure vessels," declared A. J. Moses of Combustion Engineering Co. "The improvements made in such x-ray apparatus during the past 10 years have surpassed expectations. The improvements made in the sensitivity of this nondestructive test and the reduction made in the time required for making such test have been rather startling. For instance, a few years ago we were forced to painstaking technique and to cumbersome aids, in order to make sure that radiographs would disclose cracks of the order of ½" in depth, in 4" thickness welds. Today we can detect cracks ⅛" in depth, in 6" thickness welds. Up until recently, it required 7½ hours to take an x-ray picture of 12 lineal inches, of 5⅜" thickness welds. Today, 24 lineal inches of such thickness welds are being taken in 15 minutes—a reduction in time of 60 to 1.

"We only began the study of the proper use of this million-volt equipment a few weeks ago, but from the

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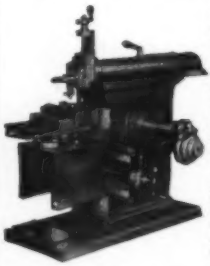

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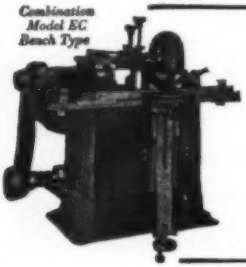

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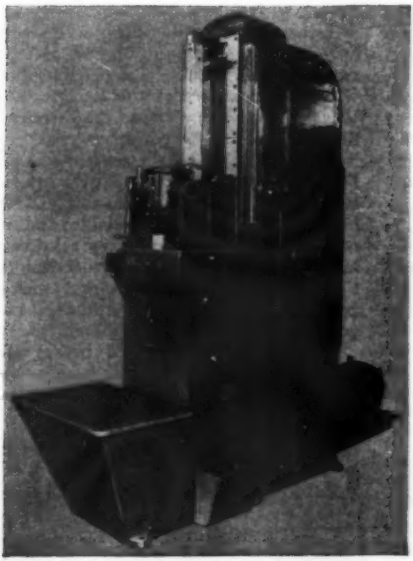

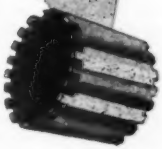

The "AMERICAN" T-6-36 3 way Vertical hydraulic broaching machine arranged for pull down operation, shown to the left, is set up for rapid broaching of 18 tongues on the ends of master rod bearings. These bearings are used in radial aircraft engines. The part broached is 3 13/16" O. D., 3½" long with ⅛" wall. Sides of the tongues must be held parallel and tongue width within .003" a tolerance of .004" on the tongue depth and index of the tongues within .001" is maintained.

Previous production on this operation which required milling and finish grinding was 3 completed parts per 8 hour day. AMERICAN production is 10 completed parts per hour and the grinding operation has been entirely eliminated. This is another example of AMERICAN aid to National Defense.

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evidence already available we can say without reservation that the development of this 1000-kvp tube is an advancement of the first magnitude. For the welded pressure vessel industry, this testing equipment pushes back our frontiers beyond horizons we hardly expected to reach a few short years ago."

Lower-voltage X-rays

X-rays of lower voltages have not been rendered obsolete by the million-volt development, E. W. Page, Manager of the Industrial Department of the General Electric X-ray Corp., declared.

"For many years after the discovery of X-rays," he stated, "we were limited in our applications to radiations produced within a fairly narrow range of voltages. In more recent years, however we have, in effect, started in the middle and worked both ways—down to 5000 or 6000 volts in one direction and up to more than a million volts in the other. Developments at both ends of the range have opened up vast new fields in which X-rays may play extremely useful roles."

The low-power X-rays, down to 5000 volts are useful in making micro-radiographs. Such pictures, of very thin metals or other materials which offer little resistance to the rays, are taken on plates that have extremely fine grain and these plates are enlarged in the microscope.

Developing the Outfit

The full time of an average of six men for four years was involved in research work that went into the million-volt X-ray outfit, including its predecessor, the similar million-volt unit for medical work, stated Dr. W. D. Coolidge, Vice President and Director of Research of the General Electric Company, and consulting engineer of the General Electric X-Ray Corp. "And," he added, "this work was not from scratch but with full knowledge of the X-ray generating equipment of the prior art." He paid tribute to Dr. Charlton, Mr. Westendorp and their associates for overcoming great difficulties, despite many discouragements. "The transformer, the X-ray tube, and the gas insulation were all radically new, and each contributed its share to the many difficulties," said Dr. Coolidge.

Many times in the early stages of development the transformer, with more than 200 miles of wire, broke down, he said. Then it was necessary to pump the gas out, take out the 45 bolts holding the tank together, search through the hundred odd coils for the damaged ones, and the cause of the damage, replace them, reassemble the coils, bake out the moisture which they had picked up from exposure to the atmosphere, close the tank, exhaust the air, and let in the right amount of Freon, to try again.

Success was at last achieved, with development of mounting and electric control which was done in collaboration with the engineers of the Schenectady Works Laboratory and the General Electric X-Ray Corporation.

"As a result of all these efforts," said Dr. Coolidge, "we have a high precision radiographic million-volt X-ray outfit which is as dependable and as easy to operate as any of its relatively low-voltage predecessors. Furthermore, the accessibility of the target makes possible its use in ways hitherto impossible.

"This work was started before the advent of the present emergency, but its completion was hastened to meet the needs of the hour."

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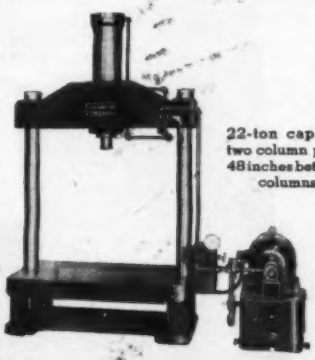

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● At the right are typical views of the present shop and drafting room.

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Molybdenum High Speed Steels

MOLYBDENUM is used as a major alloying element in high speed steel either as an equivalent to or to partially replace tungsten.

As early as 1900 it was known that molybdenum could be considered as a substitute for tungsten in high speed steel. Taylor, in reviewing the patent of Taylor and White, stated that one part of molybdenum would produce approximately the same effect as two parts of tungsten in high speed cutting steel. (This corresponds to the approximate ratio of the atomic weights of the elements.) However, a tendency of certain molybdenum compositions to develop a soft surface condition and failure to show consistent cutting properties greatly retarded the commercial acceptance of these earlier steels.

With the introduction of 9% molybdenum, 1.5% tungsten high speed steels in 1932, a high molybdenum, low tungsten high speed steel became available to the trade that could be handled commercially without excessive decarburization. This steel exhibited consistently excellent cutting properties. A parallel development was molybdenum-vanadium steel (Type II) which usually contains no tungsten, 9% molybdenum and 2% vanadium.

In recent years, certain molybdenum-tungsten balance ratio types, (Type III), have attained wide commercial acceptance by virtue of their simple heat treatment, low cost and consistent cutting properties.

Replacing Tungsten with Molybdenum

Where hardening equipment is available in which decarburization can be controlled, no difficult operating problems are involved in replacing tungsten high speed with the proper molybdenum high speed steel. Hardening temperatures and heating cycles are different for the molybdenum steels but the broad, heat treatment principles are the same as for the tungsten type. **It is recommended that buyers of molybdenum high speed steel work very closely with their respective steel suppliers both in selecting and hardening a molybdenum high speed steel that is to replace a tungsten steel.**

A report by a committee of high speed steel producers, suppliers, etc. to the Federal Government[1] has classified molybdenum high speed steel in the following categories[2] shown in Table I.

The classification includes only those molybdenum high speed steels that are most widely used and established for

1 August, 1941.

2 This classification is purely a matter of convenience; it is not intended in any sense either to favor or to discriminate against any type of molybdenum high speed steel. Neither is it intended to establish these groups as molybdenum high speed steel classifications.

TABLE 1—Analyses of Some Molybdenum High Speed Steels

	TYPE I Molybdenum-Tungsten		TYPE II Molybdenum-Vanadium	TYPE III Tungsten-Molybdenum
	A	B*		
Carbon	0.70-0.85	0.76-0.82	0.70-0.90	0.75-0.90
Tungsten	1.25-2.00	1.60-2.30	.....	5.00-6.00
Chromium	3.00-5.00	3.70-4.20	3.00-5.00	3.50-5.00
Vanadium	0.90-1.50	1.05-1.35	1.50-2.25	1.25-1.75
Molybdenum	8.00-9.50	8.00-9.00	7.50-9.50	3.50-5.50
Cobalt	See footnote	4.50-5.50	See footnote	See footnote

*Cobalt may be used in any of the steels in varying amounts up to 9.00%, and vanadium may be as high as 2.25%. When cobalt is used in Type III, it will be necessary to guard against decarburization.

commercial tool applications. Additional analyses are available from tool steel producers for special applications; steel suppliers should be consulted on this point.

Plants which are not skilled in handling molybdenum high speed steel and where the personnel is not thoroughly familiar with decarburization control, may find the following procedure helpful:

1. Select the molybdenum steel that will produce the best results and give the least trouble in working. (Danger of decarburization is least for the smaller tools which are heat treated for shorter periods of time.)

2. Broadly speaking, it may be assumed that Type III is less susceptible to decarburization than Types I and II; this tungsten-molybdenum steel can usually be treated without surface protection, using the same equipment as for tungsten high speed steels.

Regardless of the type of high speed steel being treated, tools hardened by modern, efficient hardening equipment give the most consistent cutting results. A modern heat treating plant layout is helpful in the production of any high speed tools; it is especially beneficial in the production of molybdenum high speed tools in which decarburization is an important factor.

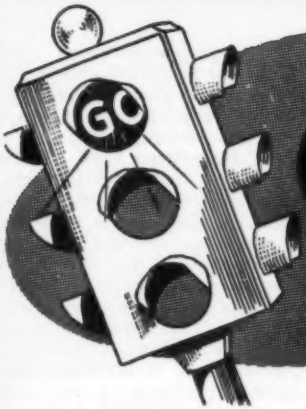
Density of Molybdenum High Speed Steel

Molybdenum high speed steels have a lower density than tungsten high speed steels; 9% molybdenum high speed steel is 9 to 10% lighter than the 18% tungsten — 4% chromium—1% vanadium type and 6% molybdenum — 6% tungsten balanced ratio type (for example) is about 7% lighter than 18-4-1 steels. Where the purchaser buys tool steel by the pound, this means that 9 to 10% more tools are available from a pound of molybdenum steel than from 18-4-1. Similarly, there is an advantage of 7% in favor of the 6% molybdenum — 6% tungsten steel as compared with 18% tungsten high speed steel. This advantage in favor of the molybdenum steel should not be overlooked in calculating the economy of replacing tungsten high speed steels with molybdenum steels.

Forging and Heat Treatment

The usual precautions for forging tungsten high speed steels also apply to molybdenum steels; recommended practice is generally similar except that the molybdenum steel is forged at a lower temperature. It is recommended that these steels be held at the forging temperature for the shortest time possible.

The steel should be annealed before forging. Large pieces should be preheated to 1000-1200° F. before raising



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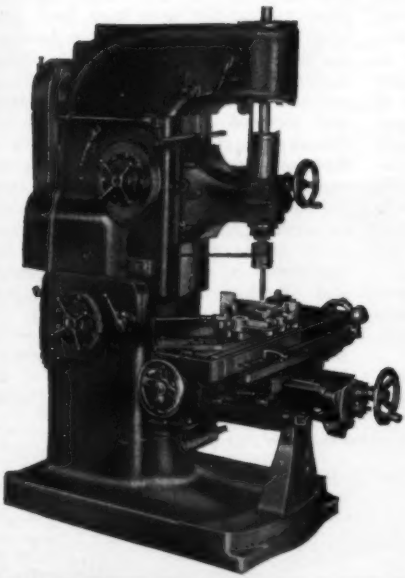

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to the forging temperature. (See Table 2.) A slightly oxidizing atmosphere is preferred where no protective coating is used. Unless long heating cycles are involved, no protection is necessary for ordinary forgings.

Borax is an effective protective coating but has the disadvantage of making the steel slippery, requiring careful handling. To minimize the fluxing action of borax on furnace refractories, an excess of borax should be avoided.

After forging, it is desirable to cool slowly to about 300° F. to avoid cracking; this can be accomplished by furnace cooling, burying in lime, mica, dry ashes, etc. Forged tools may be annealed and machined or rough ground to remove surface defects; this minimizes grinding after hardening.

Annealing

Like tungsten steels, molybdenum types should be annealed (1) after forging; (2) before hardening; (3) before rehardening. Box annealing is preferred. Where surface protection is of prime importance (in the case of partially finished tools) the use of cast iron chips, or some other mild source of carbon is recommended. Heat slowly and uniformly to the temperature indicated in Table II, then cool slowly in the furnace. Do not remove steel from the furnace until the temperature is below 1000° F.

After machining and before hardening, it may be necessary to relieve machining strains by annealing at 1150-1350° F.

Hardening

Generally speaking, the hardening practice for molybdenum high speed steels is similar to 18-4-1 except that (1) hardening temperatures are lower, (2) more precautions must be taken to avoid decarburization, especially on tools made from Type I or II when the surface will not be ground after hardening. Salt baths and furnaces with controlled atmosphere are excellent for hardening molybdenum high speed steels. Use of coke fires or the blacksmith forge is not recommended for hardening any high speed steel. Where this is the only equipment available, Type III may be so treated if an excess of air is avoided. However, surface protection is the safest practice when using this equipment, both for molybdenum and tungsten type steels.

Preheating in a separate furnace at 1250-1550° F. is the usual practice prior to transfer to a high heat furnace that is maintained at the hardening temperature. (See Table 2). When heated in an open fire or in furnaces without atmosphere control, molybdenum steels do not "sweat" like 18-4-1. Proper time at the high temperature is, therefore, largely a matter of experience. (The correct time approximates that used for 18-4-1 although time may be slightly longer where the low side of the temperature range is used.) The hardening of preliminary test pieces and examination of hardness, fracture and structure are recommended. It should be remembered that heating time is influenced by the temperature, type of furnace, size and shape of the piece and furnace atmosphere; hence

TABLE 2—Heat Treatment of Molybdenum High Speed Steel

	TYPE I Molybdenum-Tungsten	TYPE II Molybdenum-Vanadium	TYPE III Tungsten-Molybdenum
Forge	1850-2000° F.	1850-2000° F.	1900-2050° F.
Do not forge below	1600° F.	1600° F.	1600° F.
Anneal	1450-1550° F.	1450-1550° F.	1450-1550° F.
Strain relief	1150-1350° F.	1150-1350° F.	1150-1350° F.
Preheat	1250-1500° F.	1250-1500° F.	1250-1550° F.
Harden in furnace[1]	2150-2250° F.[2]	2150-2250° F.	2175-2275° F.
Harden in salt bath	2150-2225° F.	2150-2225° F.	2150-2250° F.
Temper	950-1100° F.	950-1100° F.	950-1100° F.

[1] Use high side of range for large sections. [2] Under similar conditions, Type 1B requires a slightly higher hardening heat than Type IA.

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no general recommendation can be made.

Rate of heat transfer is most rapid in salt baths and slowest in controlled atmosphere furnaces with high carbon monoxide content.

Quenching

Molybdenum high speed steels may be quenched in oil, air or a molten bath. To reduce breakage and distortion of intricately shaped tools, they may be (1) quenched in a molten bath at approximately 1100° F.; (2) the tool may be quenched in oil and removed while still at red heat (approximately 1100° F.). Cool the tool in air to room temperature and temper immediately to avoid cracking.

Straightening

When straightening is necessary, it should be performed after quenching, and before cooling to room temperature prior to tempering.

Tempering

Reheat slowly and uniformly to 950-1100° F. (1050° F. is generally used). Hold at temperature at least one hour; two hours is better and four hours is maximum. Time and temperature depend on hardness and toughness required. Where tools are subject to shock, multiple temperings are suggested.

Salt Bath

The salt bath has become popular as a method of hardening molybdenum high speed steel; with proper care of the bath the treated steel is free from decarburization, oxidation or scaling. In the salt bath, electrodes are immersed in barium chloride or some combination of chloride and other salts. Heating is uniform and the surface of the steel is not attacked chemically. It is reported that the formation of sludge may be greatly reduced by the use of refractory brick pots.

The pot should be checked periodically and necessary salt additions made. Work should be kept at some distance

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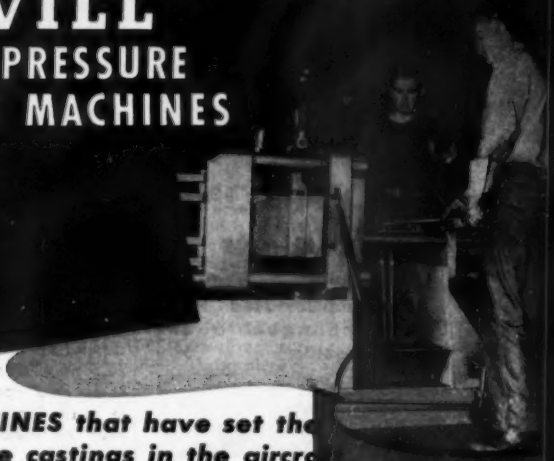

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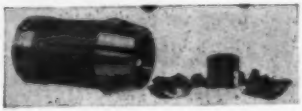

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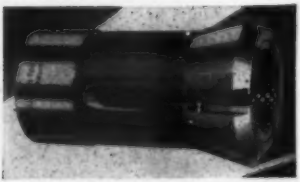

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from the electrodes to prevent arcing which may cause fusing of the tool surface. The use of a solvent degreaser or suitable alkaline cleaner, followed by a hot water rinse is recommended.

Preheat temperature in the salt bath is 1500-1600° F.; transfer to high heat bath (2150-2250° F.); allow sufficient time for work to reach temperature of the bath plus proper soaking time. Transfer to a quenching bath, maintained at 1100-1200° F. Holding time is two to five minutes, depending on the size of the tool. Remove tool and cool in air or oil to room temperature. Oil quenching is not recommended for work of intricate shape.

After the work has cooled to **room temperature**, wash off adhering salts. With certain types of salt, the use of shot or sand blast is recommended if the work is to be tempered in an ordinary furnace. (If this is not done, salt may attack the work during the tempering operation.) If the salt bath is used for tempering, the work need only be cleaned in hot alkaline solution or hot water.

There are many salt bath installations operating today with complete satisfaction for the purpose of hardening molybdenum high speed steels.

Controlled Atmosphere Furnaces

Furnaces for the heat treatment of molybdenum high speed steel are now available in both electric and fuel fired types in which the furnace atmosphere is independent of the source of heat. Atmospheres commonly used are not harmful to the steel if careful regulation and control are maintained. Complete information is available on this subject from furnace manufacturers.

To be used successfully for molybdenum high speed steel, a furnace atmosphere must fulfill the following conditions:

(1) Avoid decarburization.

(2) Prevent excessive carburization (which may cause wrinkling of

Industrial Uses of S. S. WHITE POWER DRIVE AND REMOTE CONTROL FLEXIBLE SHAFTS

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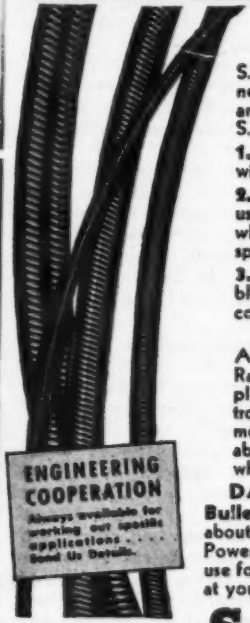

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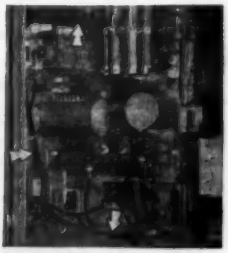

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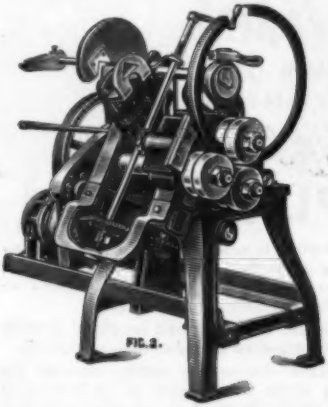

FIG. 2.

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the surface, melting of tool edges, pitting and embrittlement).

(3) Avoid harmful scale formation.

The preheat furnace must provide an atmosphere with the same characteristics as the high heat furnace.

Plant conditions and atmosphere control practice vary with the locality, type of equipment, etc.; thus, no general recommendation can be given. Competent engineering advice is available from equipment manufacturers who are glad to supply any necessary information.

Coatings

Borax or boric acid may be applied by (a) sprinkling lightly over tools heated to 1200-1400° F., (b) rolling small tools in a box of borax, (c) applying a supersaturated water solution of borax (or boric acid) to finished tools. In the latter case, the tools may be immersed in the solution at 180-212° F. or the borax may be applied with a brush or spray. Care should be taken in handling borax-treated pieces to insure proper adherence.

Special protective coatings or paints are extremely useful when properly applied; these coatings do not run or fuse and do not affect the furnace hearth. Always apply to a clean surface, free from scale or grease. Such coatings may be sprayed or applied with a brush; usually one thin coat is sufficient. (Heavy coats tend to pit the surface of the tool and may cause difficulty in subsequent removal.) Tools covered with such coatings should be allowed to dry before charging into the preheat furnace. After hardening and tempering, the coating can be easily removed by light blasting with sand or steel shot. When tools are light ground, the coating comes off readily.

Additional Suggestions

As in the case of tungsten type steels,

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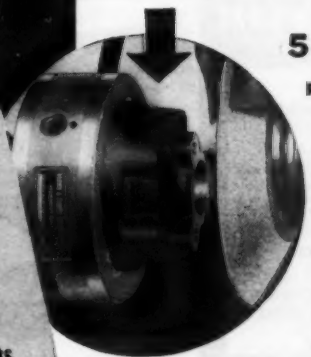

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very large tools and tools with sharp corners or variable cross-section should not be quenched too drastically in oil. It is best to remove the tool from the oil after it has cooled to or just below a red heat, and cool further in air. Equalizing in lead or molten salt at about 1100° F. and then cooling in still air is good practice.

Generally speaking, single point cutting tools should be hardened at the upper end of the temperature range shown in Table 2. Slight grain coarsening is not objectionable in such tools when they are properly supported in service and not subjected to chattering. However, if such tools are used for intermittent cutting, it is advisable to use the middle of the temperature range. Other cutting tools, such as drills, countersinks, taps, milling cutters, reamers, broaches, form tools, etc. should be hardened in the middle of the range. The lower end of the hardening range is recommended for applications requiring maximum toughness (to resist shock); slender taps, cold punches, blanking and trimming dies are examples.

Molybdenum high speed steels may be pack hardened using the same practice as for tungsten high speed steels and keeping on the low side of the hardening range (approximately 1850° F.).

Molybdenum type steels will also respond to certain special surface treatments applied to tungsten high speed steels, including nitriding by immersion in molten cyanide.

When borax is used, it is necessary to use a metal pan (preferably stainless iron) to protect furnaces with a silicon-carbide bottom. This prevents the borax or boric acid from fusing with the silicon-carbide; otherwise, such fusion will produce a glass-like insoluble coating which is impossible to remove without damaging the cutting edge of the tool.

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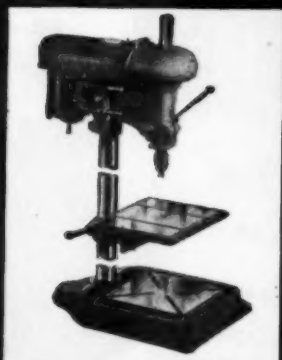

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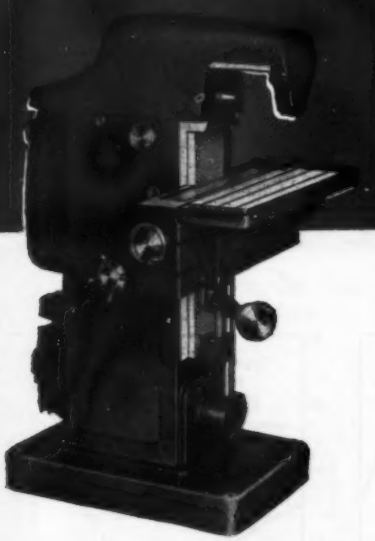

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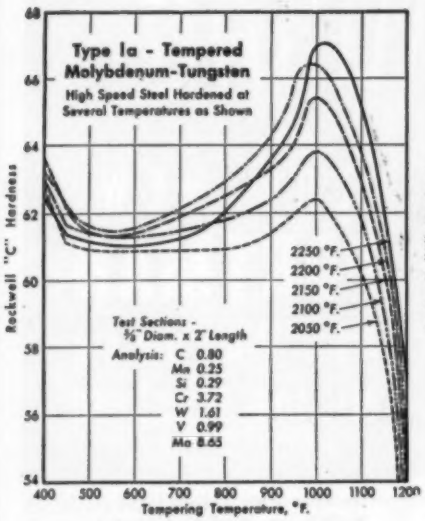
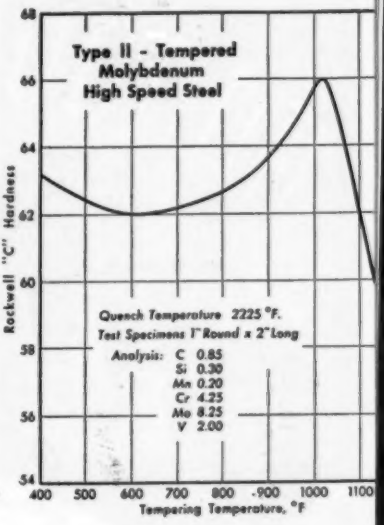
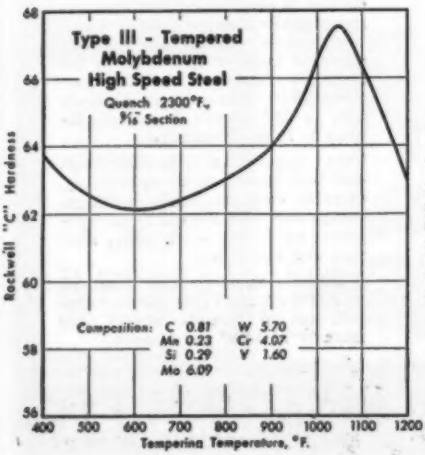
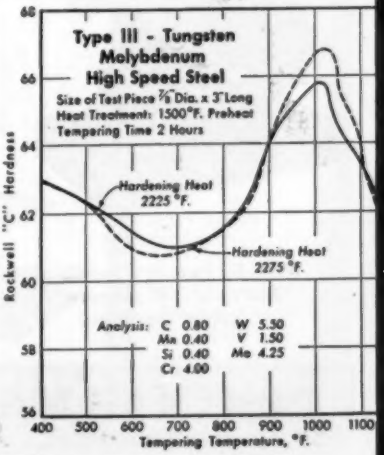
Plate 1—Tempering Charts for Molybdenum High Speed Steels









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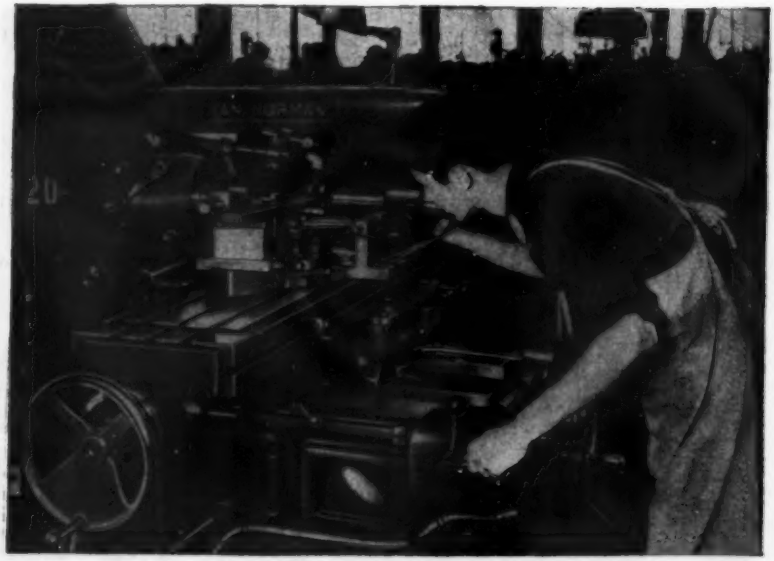

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Turret Lathe Versatility

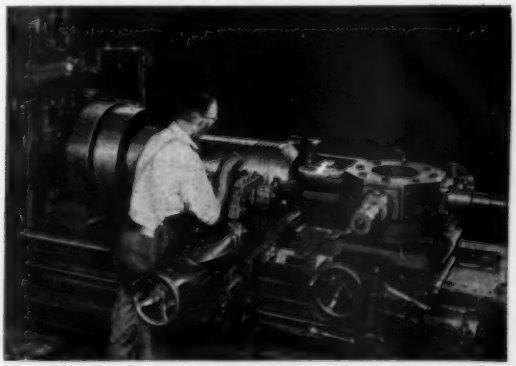
By CARLETON CLEVELAND

MODERN industrial plants would be impossible without modern machine tools. Were it not for these highly efficient tools, most of our everyday necessities and luxuries would be difficult to produce, and as for mass production, that just would be "out."

This country is largely responsible for the present-day perfection of machine tools. We also developed the modern methods of mass production. Our versatile precision tools and our mass production methods are now being put to a crucial test in the current armament program.

The term "machine tool" is still misunderstood by many. Any power-operated tool is not necessarily a machine tool. A machine tool is a highly developed and complete power-driven unit, used to cut or shape metal. It has one or more tools or working devices for removing metal in the form of chips. However, grinding, honing, and lapping machines are also included in the classification of machine tools, even though the metal removed does not appear as chips to the naked eye, a microscope being necessary to identify the chips.

With the machine tool, a bar, rod or block of metal, or a rough forging or casting, may be formed to any shape required. However, the work performed today on the machine tool is more particularly precision work. Metal can be cut to specifications ranging down to almost unbelievably small fractions of an inch.



1.—Rough turning and grooving piston on a heavy duty turret lathe.

2.—Machining cast iron bottoms for 4" hydrants.

Because of this precision, it is possible to make many parts, one after another in quick succession, so closely alike that they may be used interchangeably in assembly or in repair work, without any hand fitting.

Machine tools range in size from those small enough to be set up on a desk or small bench to mammoth units which weigh many tons and require much space for their operation.

Among machine tools, the lathe is very important. This is not alone due to rapidity of operation, and continuous cutting ability while some machine tools cut intermittently. Mainly it is because of the large amount of work and the varied operations the lathe is capable of executing. Aside from the turning operations usually associated with the lathe, drilling, boring, reaming, facing, thread cutting and many other processes may be accomplished efficiently. A wide assortment of lathe tools is used, together with numerous work-holding devices similar to many of those employed on other types of machine tools, as well as those especially designed for use in lathe work.

In practically all of the mechanical arts, the lathe, in some form, is to be found, varying in size from a jeweler's lathe of a few pounds to a turbine builder's lathe weighing many tons. Today, in hundreds of airplane, munition, and machine tool plants, the lathe is greatly accelerating the production of vital defense equipment.

The growth of the American machine tool industry is closely linked with that of industrial America, dating back to the industrial revolution in the middle of the Nineteenth Century. Step by step, the lathe has advanced in development and improvement both in design and performance capacity until today the modern turret lathe stands as a precision machine, capable of carrying out a variety of successive machining operations, — centering, drilling,

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boring, reaming, turning, and chamfering—all at one setting. The turret, situated at the right of the operator, holds six tools, any one of which may be swung into position to do its particular work.

A manufacturer of an extensive line of V-belt pulley sheaves, made from cast iron and finished all over, holding to close tolerances, was confronted with the problem of handling the various sizes of sheaves with the least delay in set-up for the different sizes. With a universal turret lathe an adjustment of the cutting tools or a re-arrangement of the tool holders in the multiple turning heads was all that was necessary to change the tool set-up for machining the different sizes. In another instance, a manufacturer of Diesel engines, sought a speedy and efficient method of chucking and machining a series of cast iron pistons in a manner that would insure uniformity of piston wall. The pistons ranged in size from 8 to 16" o.d. and 12 to 37" in length, weighing up to 750 lbs. in the rough. Resort to a heavy-duty turret lathe, equipped with special tools and holding-fixtures to handle the complete series of 13 pistons, is reported to have resulted in an average reduction of more than 50 per cent in machining time with close tolerances being held and a perfect finish obtained.

A company manufacturing water hydrants, pumps, and fire engine parts was confronted with a problem of machining miscellaneous parts in small lot production. The parts were made of steel, bronze, and cast iron. It was not a matter of increasing production but the demand for the products was seasonal, and it was desired to run two or even three eight-hour shifts per day during the busy season. This hardly warranted the investment of high-priced special machinery for each different type of work. The problem was to find a machine that could be used on many different jobs—one that could be set up quickly which would not re-

3.—Ram type universal lathe, equipped with speed selector, machining miscellaneous small parts.

BOUT of the O'TOOLS

10 ROUNDS— AIR VS. HIGH-CYCLE GRINDERS

HIGH-CYCLE WINS ROUND 1

SET-UP:

At Pressed & Welded Steel Products Co., Long Island City, N.Y. Needed four more portable tools — grinders and sanders. Short of air supply. Should it be AIR or HIGH-CYCLE? The *Rotor Analyst* recommended HIGH-CYCLE. The results:

SCORE:

HIGH-CYCLE defeats AIR in this plant with these three telling blows!

1. *Gives 25% FASTER production.* On this job, higher speed under load with HIGH-CYCLE produces 25% to 30% more work per hour than with AIR tools.
2. *Saves $1695 in first cost.* Air compressor would have cost $2632. Frequency converter for HIGH-CYCLE cost only $937.
3. *Cuts power bill $725 per year.* Saves 48.5 B.H.P. or 36.2 K.W. At 1c per K.W.H., that's $725 per 250-day year on full load basis.

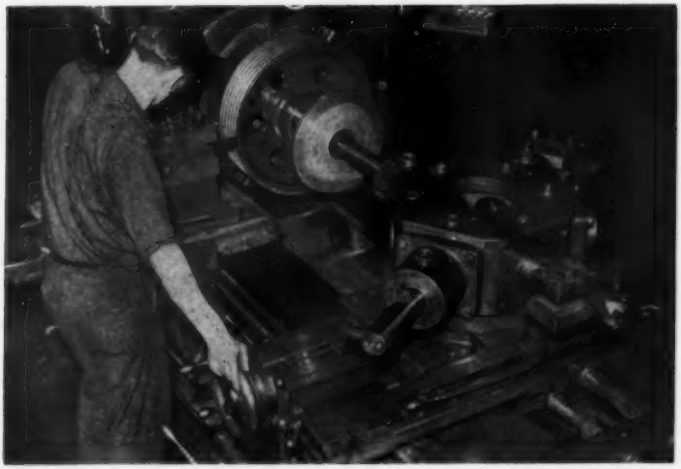
WHAT WOULD BE THE SCORE IN YOUR PLANT?

Why not let the *Rotor Analyst* stage and referee the bout of AIR and HIGH-CYCLE in *your* "ring"—to find out definitely which type of tool can turn out most work under your set-up and give you greatest savings. No obligation.

The Rotor Analyst has 65 different AIR tools and 59 different HIGH-CYCLE tools with which to solve your problems.

THE ROTOR TOOL CO.

CLEVELAND OHIO

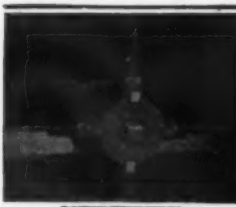


4.—Machining cast iron elevator driving sheaves on a heavy duty turret lathe.

quire too high an investment in tools. A heavy duty turret lathe and standard tools solved the problem. Time of machining the miscellaneous parts of different metals was cut in half; and the use of standard tools, which were adaptable to this type of work, materially held down the tool investment.

In some of the smaller industrial plants and machine shops, the work may be of such a nature as not to require the full time operation of a full-sized turret lathe, yet this particular type of machine may be required at certain periods. To meet such needs, a turret attachment may be obtained which can readily be applied to an engine lathe—either to the bed or to the carriage—transforming it into a turret type lathe. This removable turret body is a sturdy casting with a cored vertical center hole, and with drilled horizontal holes.

The manufacturer of machine tools has long recognized the importance of using the right metals to meet indi-



LATHE STOP $35.00

PRICES GO DOWN ON QUADRUPLEXES

The Quadruplex Lathe Stop and Turret Tailstock help ease the production load by their multiple operations. Low cost, universal adaptibility and ease of attachment make QUADRUPLEXES a "MUST" on all lathes.

F.O.B. BLOOMFIELD, N. J.

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TURRET TAILSTOCK $35.00

Dept. B 1 SPECIALTIES MANUFACTURING COMPANY INC.

35 FARRAND STREET, BLOOMFIELD, N. J.

THE *Phantom Gear* JOINS THE NAVY!

Turning time on some vital parts for Navy use has been cut from 21 hours to 3½ hours . . . six times as fast . . . with Monarch automatic sizing controls. Automatic sizing, applied to Monarch lathes, provides automatic production on such work as any combination of steps, taper and contour turning, boring or facing.

Back of such Monarch contributions to lathe utility is that attitude which we call "*The Phantom Gear.*" Made up of initiative, open-mindedness, courage to try new ideas, "*The Phantom Gear*" stimulates management and men to increase the usefulness and efficiency of Monarch lathes.

* * *

This vitalizing force, now enlisted in National Defense, has doubled our production in 1941 over 1940, without any sacrifice of quality. When peacetime returns, with its demand for more goods for more people, at lower cost, Monarch will be ready with still more useful lathes.

THE MONARCH MACHINE TOOL COMPANY • • • SIDNEY • OHIO

MONARCH LATHES

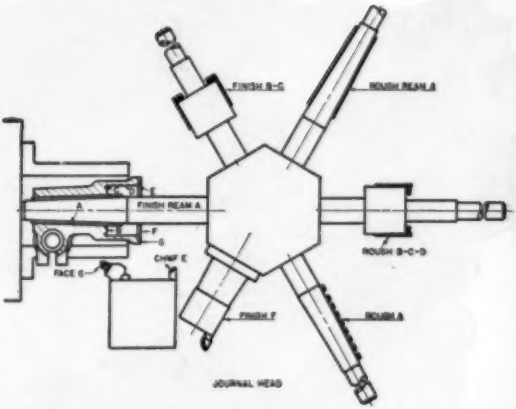
COVER THE TURNING FIELD

Monarch's March of Progress

Monarch initiative has made the lathe a more useful tool by the introduction of such improvements as:

Automatic sizing for all size lathes
Helical geared headstock
Anti-friction bearing mountings for all rotating parts
Flanged spindle nose
Automatic force feed lubrication
Anti-friction bearing taper attachment
Flame-Hardened beds

Even as the emergency presses us to more and more production, new refinements in design and shop practice are continuously at work to maintain Monarch leadership.



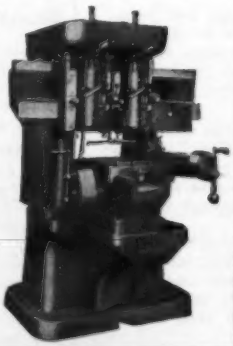
5.—Typical tooling diagram for machining journal head for a pulverizing machine.

vidual part requirements to insure general efficiency and long life. In addition to proper engineering, consideration must be given to long service life and rigidity at high speeds; sturdiness for deep cuts, and heavy feeds. Time was when lathe beds, as well as various other parts — handles, hand wheels, knobs, and even legs, were made of wood. Then came the "iron age" when fancy, ornamental scroll work became the vogue in lathe legs. Today, machine tools have gone streamlined, and are ruggedly constructed of metals of proven ability to stand up under long and constant usage.

MOREY No. 12M *High Speed*
Vertical Profiler and Miller

Preloaded precision bearings throughout.

Production of interchangeable parts requiring milling of any contour or outline can be materially speeded up by this Profiling and Milling Machine.



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Morey Machinery Co., Inc.
410 Broome Street, New York, N. Y.

Materials Handling Equipment Booklet

For use in central stations, construction projects, and industrial plants, electric motors and controls for cranes, hoists, and gantry bridges are described in a new 20-page booklet.

Features of a-c and d-c motors up to 600 horsepower for typical materials handling operations are discussed with a note on gear motor applications. Controllers, protective devices, and methods of motor braking are described and illustrated.

A two-page application chart facilitates the selection of motors and control for typical materials handling operations.

A copy of booklet B-2264 may be obtained from department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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Forms boxes or pans from one piece of metal. A straight brake as well as a box brake. Ideal for experimental shops.

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Improved to meet modern needs. Efficient and dependable — sturdy and durable.

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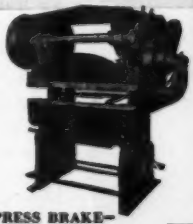
Indispensable wherever a volume of heavy plate work is done—forms a great variety of bends and shapes without dies.



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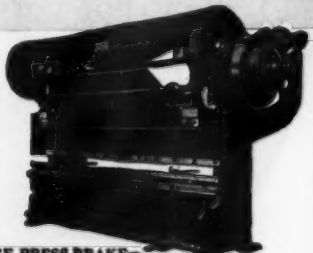
Compact, powerful money-saving production unit. Replaces cumbersome costly machines that are expensive to operate. Uses same dies as larger machines.



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ALL CHICAGO BRAKES are built of rolled steel welded sections which insure great strength, accuracy and long life. They are the most modern tools in design and workmanship to fit today's need for fast production sheet metal working machinery.

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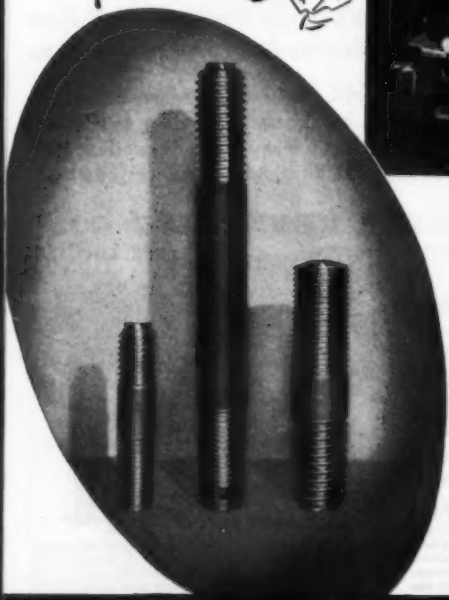

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"White" trucks, both ordnance and comm speak for themselves. For over 10 years ev creasing numbers of Namco Circular Chase have met the high threading standards White plant for enormous quantities of th of all kinds, and with never a failure. The speak for precision and endurance. What your threading?

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Automatic Shell Forging

By GEORGE WARD

A four-stage completely automatic continuous-operation shell forging machine designed to produce from 240 to 300 finish-drawn 90 mm. shell forgings per hour, directly from hot steel billets is announced by Clearing Machine Corp., Chicago, Ill. The first of these machines is already in operation.

Eliminating manual handling of shell forgings, from placing of the hot billet in the de-scaler until the finished drawn forging is ejected onto a cooling conveyor, the new machine is reported to require fewer men to operate while producing from 3 to 5 times as many shells per hour as on conventional upsetting machines.

In addition to combining in one automatic machine, operations frequently performed separately, and eliminating manual handling, the new machine offers some innovations including:—a rotary indexing die table; self-aligning punches and mandrel with automatic

1—View from the loading side with billet in loading carrier. Observe cooling stations between dies in the rotary indexing table. Lubricant tanks and cams are at upper left. De-scaler is not shown.

. 2—Drawing dies consist of a combination of rollers and rings. Beneath drawing die are shown (right to left) section of billet after leaving first punch; after second punch; after finish piercing and after drawing. An unsectioned shell forging is at extreme left. Note chute behind drawing dies from which finished forgings drop on a conveyor to cool.

stripping; combination roller and ring dies for final drawing of the shell; automatic cooling of punches and mandrel between operations and an automatic lubricating system for dies and punches designed for use of the new shell forging lubricants containing "dag" colloidal graphite.

In the new press, a steel billet is converted into a finish-drawn shell in four operations (Fig. 2). In the first operation, the billet is slightly upset to fit it firmly in die and at the same time is lightly pierced. In the second, piercing is continued and billet is changed from a square to a round form. In the third, piercing of the cavity is completed. The fourth operation consists of drawing the shell.

All three piercing operations take place without work being removed from die in rotary indexing table. Following piercing, work is automatically transferred from die table to drawing dies by means of a transfer carrier.

In addition to the three dies, the die table has three "cooling stations", located one between each pair of dies. After each forward stroke and on return stroke of punches, the die table indexes 60°, so that a loaded die and a "cooling station" are located alternately in front of each punch.

A summary of sequence of operations at each punch, etc., is shown in Table No. 1. Hot billet in loading device (see Fig. 1) is swung in front of die by rotation of die table to which loading arm is geared. The first punch pushes billet into die on the first forward stroke, slightly upsets square billet to seat it firmly in die, and pierces billet lightly.

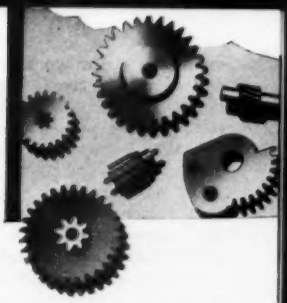
On return stroke, the aligning guide

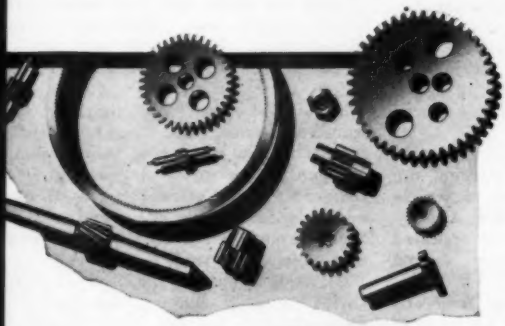
TABLE NO. 1

STROKE	FIRST PUNCH	SECOND PUNCH	THIRD PUNCH	TRANSFER CARRIER	DRAWING STATION
#1 Fwd.	Pierce #1				
Return	Strip #1				
#2 Fwd.	Cool	Pierce #1			
Return	Lubric.	Strip #1			
#3 Fwd.	Pierce #2	Cool	Pierce #1		
Return	Strip #2	Lubric.	Strip #1		
#4 Fwd.	Cool	Pierce #2	Cool	Load #1	
Return	Lubric.	Strip #2	Lubric.	Transfer	
#5 Fwd.	Pierce #3	Cool	Pierce #2	Unloading	Draw #1
Return	Strip #3	Lubric.	Strip #2	Return	Strip #1
#6 Fwd.	Cool	Pierce #3	Cool	Load #2	Cool
Return	Lubric.	Strip #3	Lubric.	Transfer	Lubric.
#7 Fwd.	Pierce #4	Cool	Pierce #3	Unloading	Draw #2
Return	Strip #4	Lubric.	Strip #3	Return	Strip #2
etc.	etc.	etc.	etc.	etc.	etc.

Combined ADVANTAGES

EVER BEFORE AVAILABLE TO THE PRODUCER OF FINE-PITCH GEARS





- ★ NEW HIGHER CUTTING SPEEDS
- ★ "GEAR SHAPER" PRECISION
- ★ ACCURATE GEARS ON A HIGH-PRODUCTION BASIS
- ★ WIDE VARIETY OF WORK (See Illustration)
- ★ QUICK SET-UP
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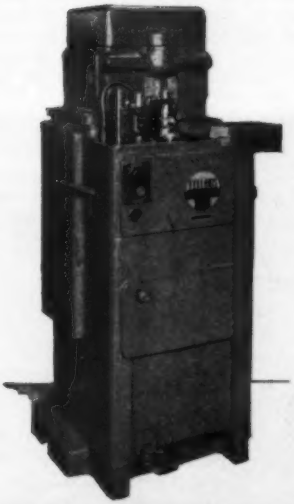


This 3-inch Fine-Pitch Gear Shaper is especially adapted to the cutting of gears and other parts for bomb and time fuses, range finders, meters, geared camera shutters, movie cameras and projectors, clocks, etc.

Cutter-Spindle Speeds up to 2,000 Strokes per Minute

enable this new 3-inch Fellows Gear Shaper to turn out small fine-pitch gears at rates hitherto unheard of. If you are making spur or helical, internal or external gears of small size, you will want a copy of the new Bulletin describing this machine.

THE FELLOWS GEAR SHAPER COMPANY

River St., Springfield, Vermont — 640 West Town Office Building, Chicago, Illinois — 616 Fisher Building, Detroit, Mich.

on punch strips work from punch. At end of return stroke, the die table indexes 60°, bringing a cooling station in front of first punch, while die containing the lightly pierced billet moves around in front of second punch.

On next forward stroke, No. 2, the first punch, after being cooled in air on return stroke, is then passing through the cooling station where it is cooled by a controlled hot water spray to restore it to correct temperature. On return stroke through opening in die table, the punch is evenly sprayed with colloidal graphite lubricant, forming a slick coating of graphite on punch to lubricate it for the next piercing operation.

At the same time, the second punch, on the forward stroke, is piercing the shell and converting it from a square to the round shape of the die. On return stroke the hydraulically operated punch guide strips shell from second punch.

The die table now indexes over another 60°, bringing forging in front of third punch, a cooling station in front of second punch, and a fresh billet in front of first punch.

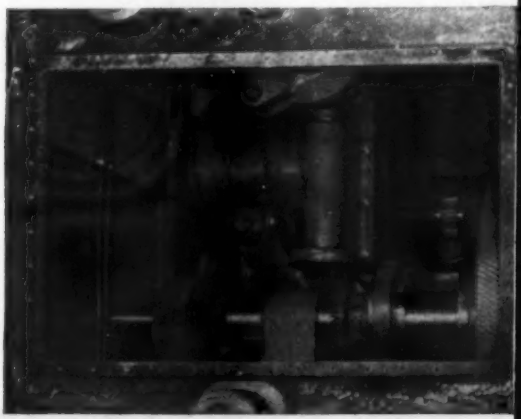
On third forward stroke, therefore, cavity of the first shell is being finished while the first punch is piercing a second billet, and second punch is passing through a coolng station. The second punch is spray lubricated on return stroke, while shells are being stripped from first and third punches.

On next forward stroke, No. 4, after die table has again indexed 60° the now finish-pierced shell is pushed out of die into a carrier (Fig. 2) from rear of die, the third and first punch are being cooled and lubricated while second punch is piercing and carrier is in position to receive another hot billet.

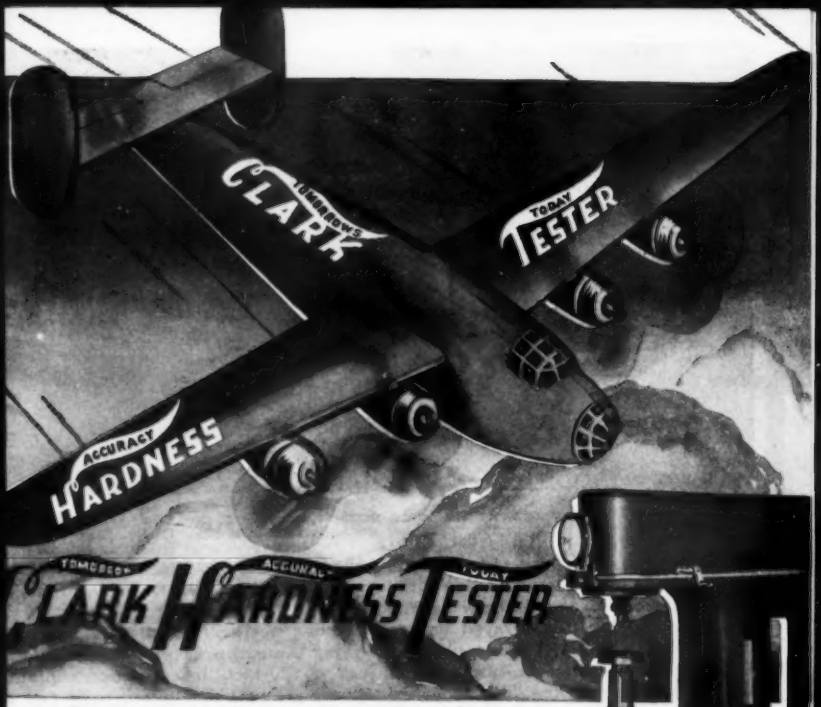
Next time die table indexes, the transfer carrier, also geared to die table, and now containing pierced shell is swung up in front of drawing unit. On next forward stroke (No. 5), drawing mandrel enters shell and pushes shell through a set of roller and ring dies which draw shell to its proper size.

On return stroke, the now finished shell forging is stripped automatically from mandrel and delivered through a chute back of drawing dies (Fig. 2) to a conveyor for cooling.

The next indexing of table swings transfer carrier back into position to



3—Cover plate at rear of machine removed to show drive mechanism to the die table, as well as mechanism to control movement of the die anvil.



This tester has been calibrated on the major load of 150 kg which consists of three calibrated weights (60 kg, 40 kg and 50 kg) and on a minor load of 10 kg.

The Clark Hardness Tester has but THREE adjustments—1. For either increasing or decreasing the minor load. 2.—Gap adjusting screw. 3.—Indicator Holder.

The main beam on the tester is controlled by the use of a dash pot which also has an adjustment to either increase or decrease the speed.

Every tester is checked and tested for accuracy in direct readings on various standard scales— C, A, D, B, E, F and G scales. Black numerals on dial give direct readings when diamond penetrator is used; Red numerals give direct readings when the 1/16 or 1/8 ball is used. Conversion Readings can be made on the tester.

CLARK INSTRUMENT, INC.

DEARBORN TOOL & DIE CO. — *Sole Distributors*

10202 FORD ROAD - DEARBORN, MICHIGAN

4—View of the complete shell forging machine, capable of producing 240 to 300 finish-drawn 90 mm., forgings per hour automatically from steel billets.

receive the second finish pierced shell. On the next forward stroke No. 6, the drawing dies and mandrel, now passing idly through dies, are sprayed with a mixture of air and water to cool them. On return stroke they are sprayed with lubricant containing the "dag" colloidal graphite, similarly to the punches.

Further indexing of table now brings die in which the first shell had been pierced into positon to receive another billet. Prior to this, however, it had been carried by indexing of table to:—first, a position in front of an air jet which thoroughly blows out the die, and second, in front of a lubricating jet. As mentioned previously, the dies are water cooled.

Design Features

Not shown in Fig. 1 is a de-scaler which may be provided ahead of automatic die loader. In this case, billet is placed in the de-scaler where scale is automatically removed. A special device scrapes the piercing end of billet, producing clean metal—a protection against scale spots in cavity of shell. From de-scaler the billet i automatically transferred to die through loading carrier.

Index operation of die-table is pro vided through a Geneva drive, while set of toggle links produces prope dwell of anvil that closes back end o dies while billets are being pierced (See Fig. 3)

Punches and mandrels are provide with a "graphoid" surface prior to in stallation. This surface, in which min ute particles of colloidal graphite ac tually form a part of the surface mater ial of the punch or mandrel, is obtaine by dipping repeatedly in an aqueou dispersion of "dag" colloidal graphite The result is that the tool has a slicl dry-lubricating finish, which is main tained in service on press by repeate spraying with the graphited lubrican between operations, preventing stick ing of punches and mandrels.

Lubricant for the punches is brough to the cooling stations in the die tabl through drilled holes from a centra connection through which the lubrican

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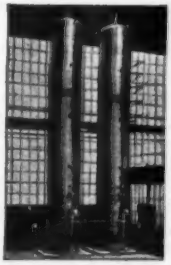
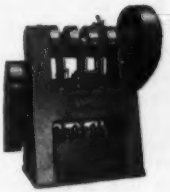
HERE are the principal types of hydraulic equipment and machinery designed and built by the Elmes organization . . . founded in 1851. Since the list is far from complete, you are invited to submit inquiries for similar products, as well as those mentioned.

Accumulators, Gravity Type
Accumulators, Compressed Air
Alleviators, Shock
Bulldozers
Fittings, High Pressure
Jacks, Hydraulic
Kneaders, Dough
Lifts, Hydraulic
Macaroni Machinery
Mixers, Dough
Oil, Hydraulic
Packings, Hydraulic
Patterns, Wood
Presses:
Abrasive Wheel Arbor
Automobile Body
Baling for Wool
Bending
Belting (Leather)
Belting (Abrasive)
Bending
Briquette
Broaching
Carbon Slug Molding
Presses:
Casket (Metallic)
Crankpin
Die Sinking
Drawing
Embossing
Extruding, Graphite, Lead, Carbon and Solder
Flanging
Forcing
Forging
Forming
Hobbing
Hot and Cold Molding
Indenting
Insulation Material
Laboratory
Lead
Leather Stretching
Linseed
Locomotive Crankpin
Macaroni
Metal Drawing
Mica
Presses:
Nosing
Paste Goods
Portable
Powder
Pulling
Silver Refiners
Shell
Solder
Starch
Steel Forming
Straightening
Tire
Veneer
Vulcanizing
Wheel
Pumps:
Hydraulic, Hand, Belt, Motor or Chain Driven
Milk, Eggs, Malt or other Liquids
Pump Repairs
Retainers, Rods and Bars (Patented for Veneers)
Valves, Hydraulic





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★ ELMES ★

enters through packing glands (Fig. 1). Flow of lubricant to each cooling station, as well as flow of water for cooling is controlled through cams.

All three piercing punches with their combination self-aligning guides and automatic hydraulic strippers, are mounted on same head. The drawing mandrel is located on a separate head, but both heads move simultaneously. Reciprocating motion of punches and mandrel is obtained mechanically through large eccentrics, driven through double gearing, in turn, from machine flywheel. The latter is driven by a 150 hp. motor through V-belts, and drive unit is equipped with a solenoid controlled pneumatic clutch interlocked with a brake in such a manner that when clutch is "on", brake is "off", and vice-versa. Operation of the entire machine is through four conveniently located start and stop buttons.

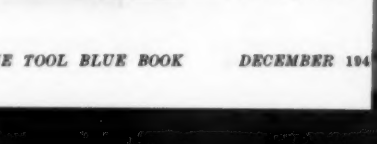
The die and punch lubrication system is entirely automatic. The lubricant may be either the shell forging lubricant now nationally available through major oil companies and consisting of "Oildag" and "dag" graphite dispersion type 1175, suspended in a paraffin base oil, or it may be a special water dispersion of "dag" colloidal graphite blended with water-soluble oils. Both of these are developments of Acheson Colloids Corp., Port Huron, Mich.

From the 110 gallon reservoir, the lubricant is piped to two metering tanks shown at top of machine in Fig. 1. On top of these metering tanks are venturi passages in which lubricant is mixed with air. Release of air pressure to each line is controlled by cams above tanks, these being timed with machine to permit sprays to go off and on at proper intervals. One cam controls flow to the die table to lubricate punches, another the line to jet in front of "empty die" station just ahead of loading position, while a third line carries lubricant to drawing die, where it is actuated during return stroke while that die is empty, lubricating both die and mandrel.

Air and water sprays are similarly controlled, these sprays being separate in all cases except at drawing die where air and water are mixed together to cool die and mandrel.

Fig. 4 shows the complete machine. For every six strokes it produces three completed shell case forgings, so that each shell (at the 240/per hour rate) is in the machine a total of around 30 seconds. Since the time for each shell in the machine is identical, close control as to size and uniformity is possible. Furthermore, the self-aligning features of punches and mandrel are designed to hold the run-out of the forgings to exceptionally close limits, so that less material actually would have to be allowed for machining.

The Clearing Machine Corp., having in their present shell forging machine successfully solved the problem of automatic handling and lubrication thereby obtaining higher production, are now engaged in designing a new type of forging machine with the outstanding feature of elimination of all excess metal of the forging. This machine, being fully automatic, is based on the principle of controlled displacement of the metal. It will be designed to handle shell forgings up to and including 105 mm., with a capacity of 250 to 300 shells per hour.



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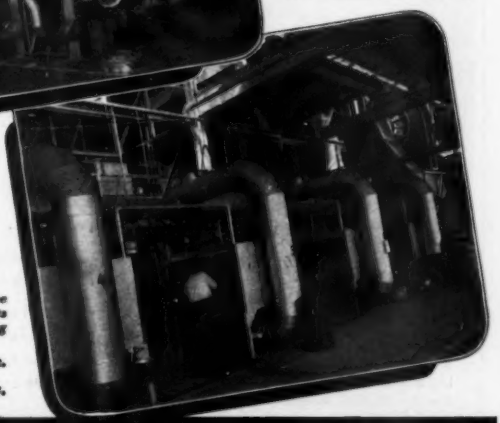

The constant exhaust volume and use of water sprays in the Type W Roto-Clone assure rapid removal of dust generated by grinders, band saws, and at cleaning benches where castings are finished.

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Write for complete descriptive bulletins on the Roto-Clone and its applications to all abrasive cleaning dust problems.

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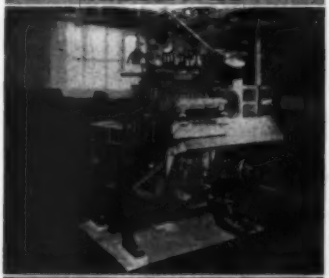

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Getting the Most from Motors

By ERNEST W. FAIR

NO matter how much care and study may be devoted to the selection of the right motor for the job, the effort may be wasted unless it is properly installed and receives the necessary attention.

The increasing development of new machinery for use in industry powered by electric motors, from the small motors on portable hand tools, to the big motors on heavy machinery means that attention must be given to these motors if the full value of the investment in the equipment is to be realized. Strict maintenance standards are necessary.

Often we find numerous uses for motors on stationary machinery and equipment and many plants have developed equipment of their own to which electric motors are attached for power. Location of the motors should always be studied with care. They should be protected from moisture, steam, dripping pipes, oil, acid, alkali and any form of gas. They should be protected from dust, be well ventilated and accessible for cleaning and inspection. Foreign materials entering motor armature may ruin them. While a motor is running, blow some smoke toward it and note how the smoke is forced through the motor by its ventilator. Foreign materials can be drawn into the motor easily if they fall into the path of this draft.

Motors intended for floor, wall and ceiling mounting generally have end shields or bearing housings which can be turned through 90 to 180°. The end shields of bearing housings should be turned around to the corresponding angle and connections properly re-arranged. Care should be exercised to see that the surfaces of the joints are clean, otherwise alignment may be so affected as to heat the bearings. The air gap should be checked for uniformity all around after the end shields have been bolted into place.

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Motors should be aligned on their foundations so that driving and driven shafts are parallel. Pulleys must be aligned so that belts will run true. Driving pinions and gears must mesh accurately. Full assurance that pulleys are properly aligned can be obtained by temporarily installing a belt and running the pulleys by hand.

Geared machines must be accurately aligned and rigidly fastened to a common base as an error of a few thousandths of an inch may produce serious vibrations that will ultimately break the shaft or wreck the machine. When gears are properly meshing it should be possible to pull a thin sheet of paper from beneath the teeth without its tearing.

The life and successful operation of electric motors depend on two things: —proper installation, and proper maintenance. Electric motors generally require less care than any other type of power apparatus but neglect of fundamental requirements may cause serious troubles that will result in damage to equipment and production tie-ups. Systematic inspection at least once a week is a worthwhile precaution.

Cleanliness is of great importance. Freedom from water, oil, dirt, grease or foreign materials, inside and out, helps to assure efficient operation.

Some mechanics use compressed air for cleaning which is not always advisable as the air may drive foreign materials into the windings of the armature and cause breakdowns.

During inspection, bearings should not be removed from shafts unless absolutely necessary. Removal tends to impair their fit.

The safest procedure in cleaning is to treat the motor as you would any high grade piece of machinery. The proper amount of oil should always be in the oil wells. Excess oil will run down onto coils and soak their insulation. Dirt and dust will then fill up the spaces

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DAVIS BORING TOOLS

between the oil-soaked coils and air circulation will be shut off. Overheating and ultimate destruction of the armature may result.

Bearing life is affected by lubrication, belt tension and shaft alignments.

Hot bearing troubles generally can be traced to oil that is too heavy, or too thin; dirt and grit in the oil; belts that are too tight; gears meshing too tightly; pulley hubs rubbing against bearings; the motor not being properly aligned causing the armature shaft shoulder to pull against one bearing or the shaft may be sprung, etc.

If armature is striking the iron of the field, it is a sure indication that bearings are worn and should be replaced. A heavy rumbling sound at the time of starting usually indicates a bearing that is badly worn although the armature may not quite touch the field.

Especial attention should be given to lubrication. Oil wells should be filled with petroleum oil, sometimes specified as high grade dynamo oil. Animal or vegetable oils or admixtures of them with petroleum oil will dry and gum and thus prevent free flow of oil to the bearings. Oiling should be done through the oil filler or overflow gauge while the motor is at a standstill. Wells should be filled to within $\frac{1}{4}$" of top of overflow gauge.

Motors are usually shipped with sufficient lubrication in the bearings to last for a limited period. The bearing housings should be almost one-half full of a good quality of neutral bearing grease, added when necessary to bring the level to this point. Old grease should be entirely removed and replaced with fresh grease once yearly.

Brushes should almost move freely in their holders and at the same time make firm, even contact with the commutator. If they stick in the holders it is usually due to an accumulation of dirt and oil. Brushes should all be of the same length.

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Multiple tool holders can be supplied at front and rear; a turret mounted on separate saddle can be used instead of tailstock.
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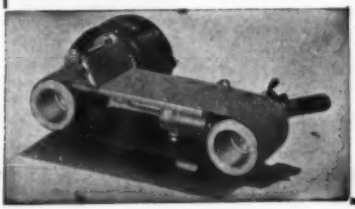

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AIR CONTROL IS HASKINS' WAY of making sure that you *get OUT* of your Haskins Tapper *all the speed, precision and dependability built INTO it.* With air control an inexperienced or even careless operator *can't* adversely affect the tapping operation. *Can't* abuse the Tapper — or the tapped part. Can't cause excess tap breakage or a high percentage of rejects!

Hour after hour, every tapping cycle is exactly the same. Every piece is tapped like every other piece. Tapped so quickly — to tolerances so close — that high speed tapping to class 3 and 4 fit becomes a practical, profitable, production line reality!

WRITE FOR A FREE BOOKLET describing the three capacities in which the Type C *Precision* Tapper is available — and without obligation ask Haskins Engineers to study your tapping problems. R. G. Haskins Company, 623 S. California Ave., Chicago.

When replacing, brushes may be fitted by means of fine sandpaper folded around the commutator with the rotor being revolved by hand in the desired direction until the proper fit is obtained. A device is available for fitting brushes.

Position of the brushes should not be shifted unless it is known that their positions are incorrect, or to change direction of rotation or mounting. On motors with commutating poles, position of the brushes is fixed on the neutral point at the factory. This position should not be shifted except to make changes, or for compounding or parallel operation.

Pigtails or flexible copper conductors should be firmly fastened in place in order to carry the full current from brush to the holder. A slight extra length should be provided, for if they are too tight, the brush may be pulled out of line and out of proper contact with the commutator.

Commutators should be clean and well polished. A piece of canvas or non-linting material is best. No vaseline or oil should be used on a commutator. Roughness is removable through polishing with a piece of sandstone having the same radius as the commutator. Sandpaper pressed against the surface of the commutator with a block of wood shaped to proper contour may also be used. The commutator should be run at a high rate of speed during polishing and the sandstone or sandpaper moved back and forth along the surface parallel to the shaft. Then commutator should be carefully cleaned of any grit which may scratch the surface of the commutator. Emery cloth should never be used on a commutator or brush for emery is a conductor.

Excessive heating of motors generally can be traced to three principal sources: — In the armature — heavy overloads, excessive room temperatures, short circuits or grounds, dirt obstructing air passages and excessively worn bearings; In field coils—short circuits, grounds or excessive voltage and; In the commutator — sparking or excessive brush tension.

When a motor fails to start upon application of power, the cause can generally be traced to one of four faults:—(1) Cut out contact dirty, phase circuit not closed; (2) Open phase winding; (3) Open main winding, and (4) Tight bearings.

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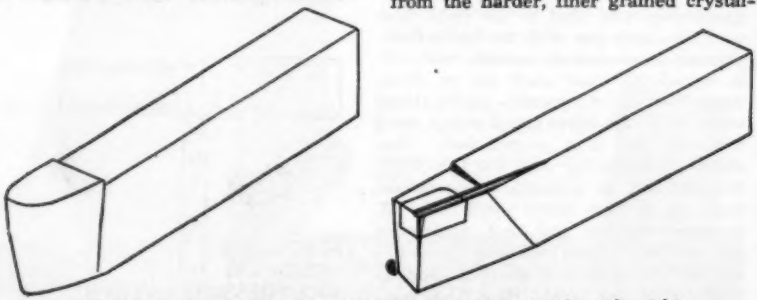
5x1 versus 1x5

By PHILIP M. McKENNA

IN tooling for turning, boring and facing operations with the new steel-cutting carbide tools on steel forgings or castings, the question is often asked: —"What if you do cut five times as fast in peripheral speed? Is anything gained compared to ordinary high speed steel tools at one-fifth the speed and five times the feed?" Let's analyze this question.

In the first place, steel-cutting carbide tools are available today that will take heavier feeds than the original tungsten carbide mixtures with titanium carbide known as Widia X and XX in Germany. This is because the new American compositions, made from the intermetallic compound tungsten-titanium carbide ($WTiC_2$), have fully 50% greater breaking strength as measured by transverse rupture tests. Thus the feeds used are pushed up to about two-thirds as great as those customary with high speed steel tools on similar work, provided the feed is not greater than .060". The speed may be as high as five times that customary with high speed tools, but for mechanical reasons, a speed double or triple that customary with high speed steel tools is usually employed.

Most carbide tools on steel work operate better at higher speeds; that is, above a certain critical speed where the tool doesn't "pick up." Like the airplane which has a low landing speed, the carbide tool which can operate without "picking up", "tearing", or "galling" at a lower speed is oftentimes preferable. Here is where the American steel-cutting carbide tool, made from the harder, finer grained crystal-

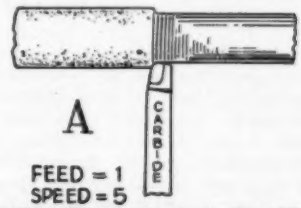


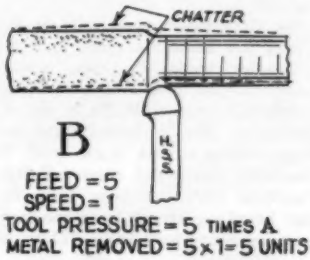
At the left is shown outline of a typical high speed steel tool—at the right, a Style 11 Kennametal tool with chip breaker.

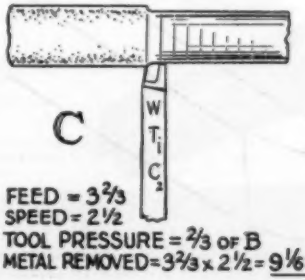
line carbide $WTiC_2$, shows its practicability—it doesn't "crater" or "pick up" at a speed considerably below the tungsten carbide mixtures with titanium or tantalum carbide. On steel of 250 Brinell hardness, speed as low as 80 ft./min. may be employed. This makes these steel-cutting carbide tools adaptable to existing machine tool equipment. Lathes and boring mills 20 years old use these tools with success. Of course, they usually put on bigger motors, or V-belt drives, or larger flat belts to get more cutting done in cubic inches of metal removed per minute. A practical formula is 2½ times the speed of steel tools and 2/3 the feed. Thus 2½x2/3 equals 1-2/3 the rate of metal removal. If the machine will stand 3 times the speed, the work is turned out in one-half the cutting time.

The force on the tool point is approximately determined by the chip cross section area being cut. With 2/3 the feed, this force is 2/3 as much, the depths of cut being the same. Thus the torque on the work, and the force twisting the work in the chuck and on the spindle, is less with the higher speed and lower feed of the carbide tool. The horsepower, being force times distance per minute, goes up. But it does not increase as much as the increase in metal removed per minute, because the loss in friction, producing heat at the point of the high speed steel tool and in the chips and work, is much less with the hard, fine-grained steel-cutting carbide tool. It is remarkable that work cut at three times the speed remains cooler than work cut at the lower speed with a steel tool, but this is a proven fact. The chips are no hotter, and the tool itself remains cool at a speed which would burn up a high speed steel tool. A tungsten carbide tool not containing the harder, friction-reducing constituent $WTiC_2$, will also get hot, due to "galling" on the point. Heat from friction means horsepower consumed, and the steel-cutting carbide tool avoids the friction.

A further consequence of the "non-galling" nature of the new steel-cutting carbide tools is that sturdier tool angles may be used in tool design, as the steeper rakes required to skid off the steel chip from the point of a high speed steel tool, often as high as 15°, are not required. Instead, 2° negative back rake and 6° positive side rake, with 6° clearances are employed. The







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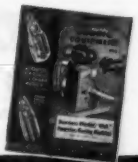

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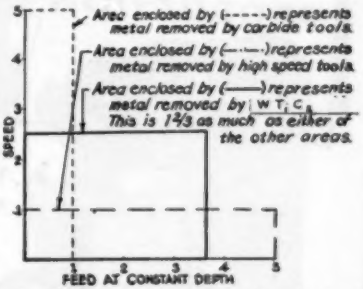
included tool angle on a high speed steel tool with 12° back rake and 10° clearance is:—90° — 10 — 12=68°, while on a steel-cutting carbide tool with 2° negative back rake and 6° clearance it is:—90° + 2 — 6=86°. This sturdier, wider tool angle makes the strains on the tool material chiefly compressive. This tool angle is possible because the new steel cutting carbide compositions skid the steel chips off the hard, non-adhering surface like water off a duck's back, or a sled runner on ice. The compressive, or crushing strength of these hard cemented compositions is 670,000 lbs./sq./in., or several times as great as hardened tool steel.


Area enclosed by (- - - - -) represents metal removed by carbide tools.
Area enclosed by (— · — · —) represents metal removed by high speed tools.
Area enclosed by (——) represents metal removed by W T₁ C₁
This is 1⅔ as much as either of the other areas.
SPEED
FEED AT CONSTANT DEPTH
1
2
3
4
5

Fundamentally, using 1/5th the feed and five times the speed is not equivalent to fives times the feed and 1/5th the speed because the tool pressure with the smaller feed and higher speed is only one-fifth as great, this lower tool pressure being easier on the chucking device, on the work itself, on the tool and holder, and on machine construction to transmit more horsepower by higher spindle speeds, rather than by heavier machine construction. More horsepower may be converted to chips per minute when high speeds are used on the same machine. The properties of the new steel cutting carbide tool metals make this practical. Thus 5x1 does not equal 1x5 in the sense intended in feeds and speeds.

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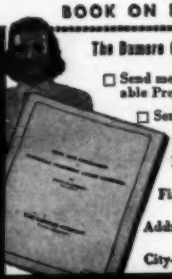

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Blind Riveting

By ALEX MULLGARDT

BLIND riveting—the art of riveting in places where only one side is accessible—has been given a tremendous impetus by the increasing demands on the aircraft industry. Search for methods of "blind" fastening has resulted in development of various devices.

The need for such development becomes apparent when it is considered that the number of rivets accessible from only one side in modern military aircraft ranges from approximately 1,000 to 10,000 or 15,000, depending upon size and type of ship. The application of blind riveting is by no means limited to the aircraft field, needless to say. Interest in a "one-man rivet" has been shown by manufacturers of a great variety of products.

Riveting is an old craft. Thus, naturally, various methods of riveting in blind spots have been developed. Patent rights on a number of blind rivet schemes have been held for many years. These devices include a wide variety of forms. Some are modified bolts. Some have mechanical methods for heading rivets. Some have hollow shanks; some are solid; some are plugged. Some carry explosive charges in the shanks for rivet heading and some are expanded by forcing a steel mandrel through from the outside.

One of the most recent developments in blind riveting is the Cherry rivet, invented by Carl W. Cherry of Carmel, Calif., and patented in 1939. Under a license agreement with the inventor, Cherry rivets have been developed and perfected by the Cherry Rivet Co., Los Angeles. Close collaboration between the manufacturer and the research department of the Aluminum Company has resulted in many improvements over the original design.

The self-plugging Cherry rivet, which is being used in large quantities by aircraft manufacturers, has a stem or mandrel with an expanded section. (See Fig. 1.) This expanded section is pulled into the hollow member and

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expands the shank when the rivet is applied. The outside end of the stem breaks off during application and may be trimmed to a flush surface with ordinary multiplying nippers. This type can be applied and trimmed at the rate of 540 per hour by one unskilled workman, according to time tests made by one of the leading aircraft manufacturers.

Cherry rivets are applied with a gun which exerts a pull on the head of the stem, and a push on the head of the rivet. These forces, ranging from 300 to 900 lbs., depending on size of the rivet, draw the stem through the rivet, expand the shank, and form a tulip head on the blind side.

The conventional solid rivet, whether made of ferrous or non-ferrous material, must be considered as the gage or standard by which any other design of rivet material is to be judged.

The conventional solid rivet when properly applied in a joint does two important things:—in the process of upsetting or "bucking" the rivet into place its body or shank swells so as to completely fill the hole into which it has been placed, regardless of minor irregularities or interstices within the hole itself. This gives the maximum bearing area of the structure on the rivet. Second, an actual elastic strain is set up in the rivet between the preformed head and the upset head on the two opposite sides, so that the plates to be joined are squeezed together in that position.

The importance of having a completely filled hole, and of having the component parts of a joint clinched together may be seen readily when it is realized that a riveted joint is considered to have "failed" when there is any appreciable slip or "working" between its component parts.

As a result some other part of the structure will become subjected to excessive strain because the loosened riveted joint is no longer carrying its share of the imposed stresses.

This slip or "working" of a riveted joint implies either complete or partial reversal of stresses through the structure. In aircraft such reversals of stress are the rule rather than the exception. They may be in the form of vibration, or in actual reversal of forces due to changing air and landing-loads. It will be seen then, that the value of a riveted joint lies primarily in its resistance to "working."

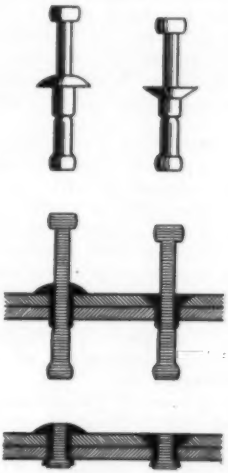

Fig. 1—Self-plugging Cherry rivet assemblies in both the brazier and countersunk types before and after heading-up operation.

In the Cherry rivet, due consideration has been given to completely filling the hole. Regardless of irregularities or divergence of relative diameters of rivet and hole before upsetting, the Cherry rivet is claimed to fill the hole as well as the solid rivet. Also, when the tulip head is formed in the final sequence of upsetting, the Cherry rivet clinches the plates together in the same manner as the solid rivet. These com-

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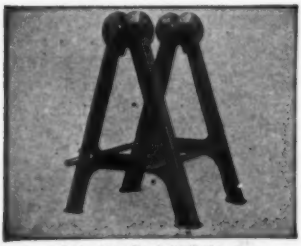

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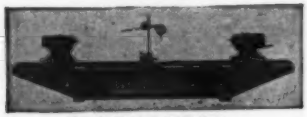

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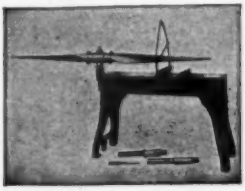
Left: Propeller Balancing Tool.
Below: Propeller Pitch Checking Table



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bined features are thought to be unique in the Cherry rivet, for it is believed that other blind rivets available now rely upon very accurate reaming of the hole to gain an approximation of the effect of a solid rivet, and are therefore more in the class of a modified bolt.

A bolted joint does not have as much resistance to fatigue as a properly riveted joint of the same material. The reason is obvious—the hole must be large enough to fully allow the placing of a bolt. When it is necessary to replace a badly upset rivet, many production men find that the job can be handled very satisfactorily with the Cherry rivet.

Final inspection will sometimes belatedly discover several loose or cracked rivets in a closing panel. To put the job in passable shape would ordinarily require opening up the whole assembly and starting from scratch. The value of Cherry rivets in such a situation is obvious.

Engineers know how often it is necessary to expend a great deal of valuable time and ingenuity in order to circumvent "blind spots." However, by the very nature of the animal, the modern air-frame is probably the most highly complex structure for its size in the world today. There is absolutely no precedent in experience where strength is so at war with weight, or space with intricacy. Working under such handicaps, it is inevitable that hard-to-get-at spots are legion; that is, spots that are hard to get at from two sides.

Cherry rivets have already proven themselves in true blind spots. They are also being used in increasing quantities on hard-to-get-at spots. One man with a Cherry rivet gun is standing up to do the job which formerly required him or his bucker-up to worm his way through a metallic labyrinth clutching a bucking-bar. If aforementioned bucker-up was careful, he and his bucking-bar didn't damage or foul anything, but when he got out, the inspector went in to make sure. Time for production and inspection may both be reduced with this new aid.

Probably the biggest saving of all, however is yet to be realized; saved at the source in the designing and layout group. When a design is simple it can now stay that way. It will be unnecessary to redesign some structure to bridge over blind or hard-to-get-at spots.

Fig. 2—One type of automatic gun used to head-up Cherry rivets. Through pneumatic and hydraulic pressure gun exerts a pull on the stem of the rivet, thereby forming a head on the blind side.

While developments of these rivets and the tools to apply them have so far been directed toward the aircraft industry, indications are favorable for their subsequent use in other fields.

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Illustrated below is an interesting arrangement of horizontal and vertical spindle heads on a jig used at the Boeing Aircraft Plant for quickly drilling, reaming, countersinking, etc., on aircraft spars. Three horizontal spindle heads are shown in the foreground. All are equipped with JACOBS CHUCKS.

THE JACOBS MANUFACTURING CO., HARTFORD, CONN.

Carbide Tools on Short Runs

THAT "mass production" industries can save money by making and re-tipping their own carbide tools has long been known, but recently it has been found that such a program offers economies possibly even greater, where production runs are relatively short.

The Saginaw plant of Baker Perkins Inc., one of Michigan's large machinery manufacturers is engaged in making equipment for baking establishments and other widely diversified machinery. The company operates its own foundry, where iron and bronze are cast. Its machine shop (Fig. 1) equipped with lathes and boring mills from the smallest to the largest, can handle operations on parts weighing up to several tons (Fig. 2). Flexibility of equipment is essential, especially since parts and machines are usually made, either singly or in small lots. The plant normally employs from 600 to 800 men.

To perform the many different operations required in the machine shop, an unusually large number and wide variety of cutting tools is needed. Often the tool shanks or the tips must be specially shaped to fit them for working in difficult positions, or on unusual shapes. A broad range of shank sizes is kept on hand, although the most used sizes are ⅜" square, ½" square, ¾" square, ¾x1½" and 1x1½".

Fig. 1. General view of machine shop. Notice variety of types of machine tools, also sizes and nature of parts being machined.

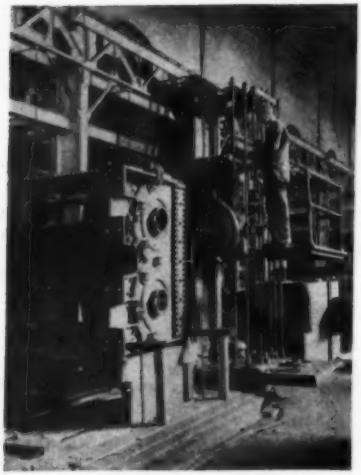

Fig. 2. Wide divergence in kind of work done is indicated by the face milling operation shown. Part is the body of a chemical mixer. Milling cutter is of Carboloy inserted blade type.

Although high production, as such, is required of tools in only a few instances, Carboloy tipped tools are extensively used, for the following reasons:

(1) They eliminate sharpening on long continuous cuts on large parts.

(2) The need for maintenance of accuracy in cuts of even a few feet requires tools with a minimum of wear.

(3) The high degree of surface finish desired on many parts, calling for high cutting speeds with a small feed.

As a result, approximately 1/3 of the tools used in the shop are of this type, with the remainder of high speed steel, etc.

Although the total carbide tool bit consumption is relatively small compared with a "mass production" plant, it has been found economical for the company to make and tip its own tools. When tipped with carbide, the shanks are made from S.A.E. 1040 or 1050 steel. Standard shapes and sizes of shanks are utilized wherever possible. Similarly, standard shapes of Carboloy tips are used, due to their low cost, even though the cost of regrinding to special shapes, often required, is added to the initial cost.

During the life of a single tool, it may pass through a variety of "stages". The shank may originally be made and tipped in the plant (Fig. 3) or purchased as a complete standard tool. It may then be used in its initial shape for a time or reground to a special shape immediately, to suit some unusual requirement. After the job requiring the special shape is finished, the tip may either be again ground to a standard shape or the shank may be retipped and the cycle repeated. When the tip becomes too short for further use, the shank is remilled and a new tip inserted. In a few cases the shank as well as the tip may be re-shaped to make some new tool. Even a larger standard shank may be remade into a

Fig. 3. Baker Perkins reduces tool inventory and cost by welding Carboloy tips on shanks of lathe tools in welding department. Welding rod and oxy - acetylene torch are used for this operation.

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Specifications and prices for thirty-five styles of standard tools in many shank sizes and 177 standard blanks are listed in the new KENNAMETAL Catalog No. 42. In addition, typical applications for each style of tool are clearly illustrated by line drawings, photographs and information on specific examples of the use of KENNAMETAL have been included. The new KENNAMETAL round shank boring tools, cut-off tools, roller type turning tools, and solid round tools are illustrated and described.

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Fig. 4. Conversions from standard tools are made in the tool room. Tools are ground by experienced men familiar with the requirements.

smaller one of special form. Thus, a single shank may be used in a half-dozen different ways before it is finally discarded. In all cases, the shanks are remilled and retipped until they become too short for further use in any of the machines in the plant for which they are suitable.

While a large number of carbide-tipped tools is kept on hand, the process of regrinding and reforming the tips and shanks reduces the total number required (Fig. 4). Normally from 50 to 100 shanks are retipped per month (not counting the initial tipping of a new tool) at a saving of approximately 40 per cent of the cost of purchasing new standard and special Carboloy tipped tools.

By using carbide tips on carbon steel shanks, the total quantity of tungsten used during the life of each tool is much smaller than when the tool is of high speed steel—an important consideration from the standpoint of tungsten conservation for defense work at this time.

All tips are brazed in place by acetylene torch welding, using "Easy-Flo" rod or strip. The latter is formed and inserted under and around the sides of the tip prior to heating. Only a few minutes are required to attach each tip, the work being done by one of the regular welders in the welding department of the plant.

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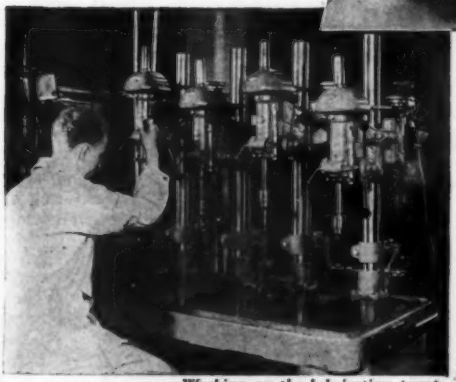

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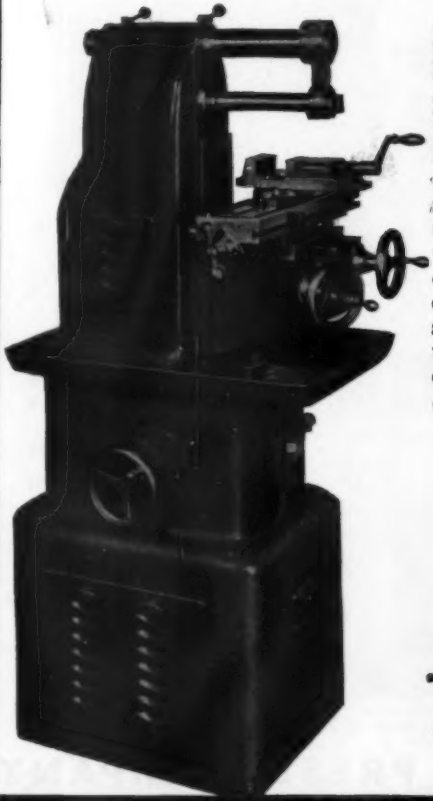

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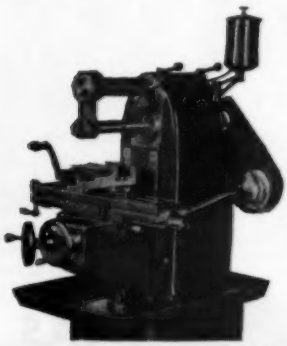

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Profits from Scrap

By AL BERNSOHN

THE junk man makes a deal with the foreman to cart away all the grindings, cuttings and scrap from the factory and to pay a certain price for the stuff. He does a fairly clean job of it and doesn't let too much collect between calls. He pays cash on the line so that's all the attention the factory heads paid to the waste.

Anyway, that was the general situation until recently. Suddenly, waste grew in stature and importance until it became an important part of the Defense Program. Priorities shut off supplies of some of the metals and a few of the more alert factories found that they could refine their scrap and keep civilian production rolling a while longer. Scrap started attracting attention of the men in the front office.

Let's follow this material through its regular channels, then see how we can make the disposition of it as profitable as possible.

A little peddler with a wagon or truck has been picking up your odds and ends of metal if yours is a small factory. His wagon is also used to haul paper, rags, old rubber and other things too. If yours is a larger factory it has probably caught the attention of a bigger operator, one who specializes in iron and steel or in "brass" or "metal" (collective names in the secondary metal trade for all non-ferrous metals). These men can afford to pay a slightly higher price for their loads.

The peddlers take their collections to the various "yards." Dealers who run these yards aren't the small fry they were 25 years ago. Back then the junk dealer drove his horse and cart about and sold his collections directly to the converters. Now the dealers specialize.

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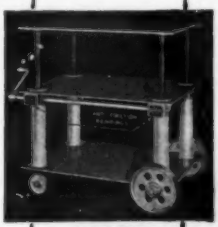

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A wide variety of work comes into a jobbing machine shop. This work offers an opportunity to compare hack saw blades under many, different conditions. One Eastern shop first tried Capewell power blades for sawing cast steel bars, then adopted Capewell for all cutting — which included the very hard and stainless steels. Now this shop reports Capewell cutting "twice as much" as previously used blades, thereby lowering blade cost and reducing cutting time. Better get acquainted with Capewell hack saw blades yourself.

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CAPEWELL

HACK SAW BLADES

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THE MOLYBDENUM HIGH SPEED HACK SAW BLADE

In most cases they handle either paper, or rags, or iron, or "metal." Let's assume the peddler has taken your scrap iron to a yard dealing chiefly in that metal. This yard is equipped with trucks, cranes, magnets, shears, etc., to cut scrap to more easily handled sizes and with hydraulic bundling machines worth $40-to $50,000 apiece! It's not unusual for a junk yard to possess from $50,000 to a quarter-million dollars' worth of equipment!

Presses pack the scrap iron into tight little 500-pound bales, so compact that 50 tons of the metal may be put into one carload, a saving in space and consequently in shipping cost. It also assures the dealer a higher price for his scrap since highly compressed metals lose a smaller percentage of their weight due to burning, instead of melting, than does loose stuff.

If yours is a large factory with huge quantities of scrap metal it might pay you to try to make a deal directly with a yard to pick up your waste. The yards can afford to pay somewhat more than the wagon peddler because no middle man is involved. Also it assures the yard of your supply of scrap, whereas a peddler may become disgruntled with the yard and take that supply elsewhere.

Non-ferrous metals are handled somewhat differently than are iron and steel. They go to the smelter rather than to the mills. Brokers sometimes pick up the supplies of scrap iron from yards in order to make full carloads, but most yards deal more directly with smelters.

There are two major kinds of refiners. Anaconda, which works with ore represents one. The other kind is of a type similar to the Federated Metals branch of American Smelting and Refining Co. This latter group deals in scrap "brass." Discarded copper cable from factories or trolley wires is valued highly by the refiner as is lead covered cable of the sort used in underground installations.

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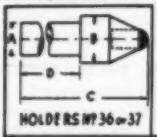
Chicago, Cleveland, Los Angeles, Newark, Philadelphia, Pittsburgh, Worcester, Mass.

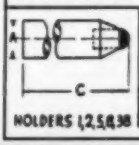
HOW TO ORDER

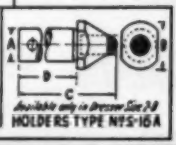
Grinding Wheel Diameter	Grinding Wheel Width	Correct Dresser	Price Each
Up to 20"	Up to 1½"	2-B	$ 9.60
Up to 26"	Up to 2½"	3-C	12.60
Up to 42"	Up to 8"	4-D	15.35

*Mounted Free in Desired Holder. Standard Holders shown below. Special Types when needed. Allow 1 Week—10 days for holders No 37, 38, and S-16-A.



Holder	A	B	C	D
1	½		1⅝	
2	⅝		1¾	
5	⅝		4	
8	⅝		1¾	
36	½	⅝	2⅝	1⅝
37	½	⅝	2⅞	1¾
38	½		3⅝	
S-16-A	½	⅝	1⅜	H





CARBOLOY Diamond-Impregnated WHEEL DRESSERS

formerly went to the large dealer or the truck peddler now are sold directly back to the source of supply as a prerequisite to the factory receiving certain new supplies that are scarce. Taking a hypothetical case, if American Brass sold a company a large supply of that metal and the company wanted more for civilian production, American Brass might well expect that company to return its grindings and scrap directly to its original source. Then the company returning the waste might be credited with a certain percentage of that metal which is, in effect, resmelted and returned to the purchaser for a moderate fee.

The percentage credited to the shipper in these cases varies with the nature of the scrap; a small percentage of the waste is lost at any rate. In the case of large units of comparatively pure metal, the loss may be 5 per cent or less, but where the scrap metal is nearly powder fine and is adulterated with grease or dirt, 25 per cent or more by weight easily may be lost in the refining.

One precaution factory owners often fail to observe is to check prevailing prices when they make their deals with the metal peddlers or dealers. Good sources of information on current prices of these metals and the general market conditions on them include the daily metal papers such as Daily Metal Reporter, American Metal Market or Daily Metal Trade. Iron Age is a favorite weekly of the metal men. Prices published in these periodicals vary in the different major markets and they're largely influenced by prices set by the government.

A couple of other good reference sources for the man interested in getting a better background on this newly-important phase of defense and civilian production are: Metal Statistics, 1941, published by The American Metal Market, and the Waste Trade Directory, the latter a manual of statistics and

KEEP YOUR TAPS and DRILLS in PERFECT CONDITION

These vital tools are now on the "critical list"

GRAND RAPIDS Combination Tap and Drill Grinder No. 10-B

Tests have proven that taps and drills ground on this machine will cut with less than half the power required for hand ground taps and will stay sharp considerably longer.

For grinding taper or straight shank drills, and drills with enlarged shank or sockets, you can grind small and large drills, straight, and then taper shank drills with one easy adjustment of the tailstock.

Write for full details.

GALLMEYER & LIVINGSTON CO.

405 STRAIGHT AVE., S. W. GRAND RAPIDS, MICH.

lists of dealers in secondary raw materials.

It's hardly practical for the dealer to attempt to handle all the sources of waste metal himself, so he confines his efforts to the really large ones in his territory and turns over any other "accounts" he may pick up to a peddler on whose loyalty he can depend. One yard may have 75 or 100 peddlers calling on it regularly, bringing in 125 or 150 tons of scrap metal a day! This is far more than it would be practical for the dealer's own fleet to pick up since the bulk is acquired in small units.

Indicative of the new importance of waste we find that 1938's collection of scrap iron was about 21,000,000 tons while 1940's was 41,687,000. Approximately 50 per cent of the new steel produced is made from scrap iron, which is far cheaper to handle than ore.

Freight costs are of vital importance in these shipments of metal. If prices are high, freight costs are more than compensated for in the profits accruing from shipping goods from a distance. If they're low it's best to leave the scrap metal where it is now. The industry is advocating a receding price on iron and other metals, the difference in the price being exactly the difference in the shipping costs. The Office of Price Administration, under Leon Henderson, has set a flat price on all metals at this writing and the industry is attempting to explain that the receding price would mean that approximately a million tons of scrap metal in remote sections of the country could be brought into industrial centers and put to work in defense production.

Chief of the industrial centers for iron are Pittsburgh, Boston, Chicago, Cincinnati, St. Louis, Detroit, New York, Toronto and Montreal. Non-ferrous metals clear through New York, Philadelphia, Buffalo, Pittsburgh, Detroit, Chicago, St. Louis, Boston, Cin-

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DIAMOND TOOLS

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ARBOR PRESSES

12 sizes ¾—to 10 tons. Bench and Floor Models, Simple or Compound Leverage. Alloy steel rack and Gear.

Milling Machine Drill Press and Shaper

VISES Plain or Swivel— 5 types.

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Dealers: Some Choice Territories still open

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. . . give you Faster more Accurate Tapping

Procunier Universal Tapping Machines give increased output, more accurate tapping and tremendously increased tap life. The features that make this possible include: 1. Four Speeds, ranging from 390 to 2050 R. P. M., efficiently handle jobs for which conventional high speed tapping machines are inadequate. 2. One machine handles tap sizes from No. 2 to ½" through two interchangeable heads. 3. Extra long Spiral Compensating Springs conveniently located, with wide range hand-screw adjustments, maintain pre-set tap feeding and reversing pressure INDEPENDENT OF OPERATOR.

Tap Establishes Its Own Lead

The new Procunier Universal Tapping Machine is so designed that it actually allows the tap to establish its own lead. There is nothing more accurate than the tap itself in thread-cutting—so maximum tapping efficiency is attained where the tap is free to establish its own lead in cutting the thread.

This means more accurate tapping with every thread uniform, greater production with less spoiled work and less tap breakage.

SEND FOR BULLETIN giving full details, description and prices on the full line of Procunier Universal Tapping Machines, hand, foot or air-operated, the complete line of Procunier Precision Tapping Heads to meet all needs and the new Tru-Grip Tap Holder.

PROCUNIER

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Heavy Duty Spot Welders

Dyer Welders are available in a wide range of sizes and capacities—air or foot operated, giving maximum production—simplicity of operation—power economy.

Floor models 10 to 35 KVA.

6 point selective switch on all floor models allows for quality welds on various materials. Standard and Underwriters Labeled Machines.

3 point switch on bench models.

Bench models 2½ to 10 KVA—with or without pedestal.

Few Territories Available.

The Topeka Foundry & Iron Works Co.

300-332 Jackson St., Topeka, Kansas

cinnati, and Cleveland. Prices in these and other various markets are found listed in the financial papers serving the waste metal fields.

It might be wise for the shop owner today to start nosing around in that waste department of his plant. There might be some extra earning power there.

A recent bulletin is pertinent:

Rumors circulating in the iron and steel scrap trade that the Office of Price Administration is considering an increase in ceiling prices have been emphatically denied by Leon Henderson, Adminstrator.

Mr. Henderson also declared untrue reports that his office plans to change or eliminate various grades of scrap covered by the schedule so that higher ceiling prices would result for some types.

"These rumors appear to have been inspired by certain members of the trade," the Administrator said. "Their effect is to influence dealers to refrain from collecting and selling scrap in normal amounts in the belief that they will profit by waiting for higher prices. As a result, scrap accumulates in huge quantities in dealers' yards. Steel plants urgently in need are unable to buy sufficient scrap to maintain their operations at the high levels demanded by the defense program.

"With the stage thus set, stories begin to appear blaming the interruption in supply on the 'inadequate' prices allowed by the OPA scrap schedule, accompanied by widespread demands that the ceiling be raised to relieve the situation," according to Mr. Henderson.

"The maximum prices established in the iron and steel scrap schedule are ample to bring out all scrap available," Mr. Henderson said. "No increases in the general price level are warranted and none will be made. Neither will the schedule's grade definitions be changed.

"Dealers who are hoarding scrap in anticipation of higher prices may find themselves in an uncomfortable situation if their actions continue to hinder the progress of the defense effort."

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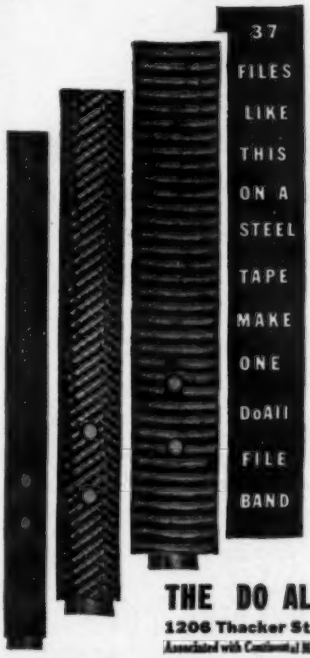
DoAll
BAND FILES

★ **Out with slow hand filing! DoAlls are 8 times as fast.**

★ **Away with jig filing! DoAlls are 5 times as fast.**

● That's absolutely true —and they last twice as long as ordinary files because there is no back stroking. A rigid, continuous file flows smoothly and evenly in one direction only, turning out finished jobs with amazing ease and speed.

Don't wait! Keep up with today's fast moving pace. Investigate DoAll Band Files right now. Send for literature today.



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Defense Supplies Rating Plan

By DILLON STEVENS*

THE Defense Supplies Rating Plan was formulated to establish a priority method which would apply to manufacturers of staple defense supplies. It applies particularly to items that must be manufactured before they are ordered as opposed to many war supplies—like planes, guns, etc.—which are ordered first and manufactured afterwards. Tools must be in supply in stores in every city and town in the country. They must be available at all times to the mechanic who needs them. They are termed "off-the-shelf" merchandise.

It is necessary to have priorities to buy steel and supplies. The tool factories cannot buy steel to make tools unless they have priorities. It is the Government's desire that tools be kept available through the channels that are doing a good job of supplying tools to the various categories listed as necessary to the national defense. The only way this can be checked upon is by having such outlets supply true statements of the percentage of sales of tools going directly or indirectly for defense. These are supplied to the manufacturer. The manufacturer coordinates and compiles these thousands of reports and from them makes up his case to put before the proper governmental authority to be awarded a priority to obtain raw materials to make tools and deliver through the outlets in question. If the manufacturer does not receive these statements from his customers, he in turn cannot get raw materials to build tools and hence the supply will be cut off. It is therefore, absolutely necessary that the manufacturers and their thousands of dealers cooperate so that supplies to both be maintained. The first step in this cooperation is the filling out monthly by the merchant of the forms requested by the manufacturer.

The manufacturer, in self-defense and in order to carry out the spirit of the Government's intention, must limit supplies of tools to merchants who show a low percentage going to necessary channels, and he is thoroughly justified in cutting off supplies completely to merchants who do not cooperate to the extent of returning the report forms properly filled out.

The Defense Supplies Rating Plan appears to be a good and workable system but no system will work itself. Unless each link in the chain performs its part thoroughly and promptly, supplies will be limited. True, a lot of work is involved. That is one of the sacrifices necessary in a war economy. The work cannot be avoided except at a terrible cost in shortages of merchandise. Full cooperation is urged on the part of every merchant handling goods coming under the Defense Supplies Rating Plan.

*Chairman, Coordinating Committee for National Defense, of the Service Tools Institute, Box 707 Vernon P. O., Los Angeles, Cal.

Checking Internal Spur and Helical Gears

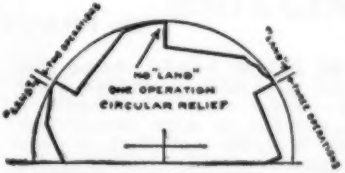
A new circular on checking of internal gears on their Involute Measuring Machine is announced by Fellows Gear Shaper Co., 78 River St., Springfield, Vt. This material supplements a recently published bulletin on the machine in which no details were given as to the proper procedure to follow in checking internal gears. Detailed drawings help the reader to follow the directions given.

CIRCULAR RELIEF GRINDING

WITH NO "LAND"

ONE MACHINE • ONE SET-UP • ONE OPERATION

1. Dress the face of the grinding wheel so it has exactly the same curve as the tool to be ground.
2. Offset the tool from the center of the curve of the wheel to give desired clearance.
3. Grind clear to the cutting edge.



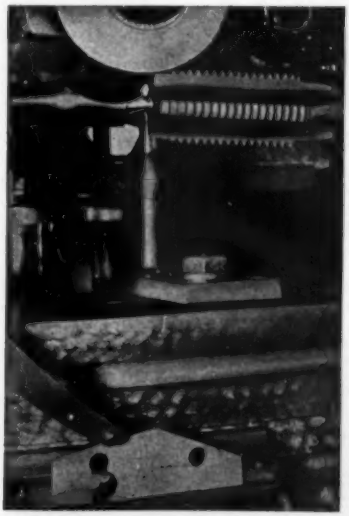
COMPARING CONVENTIONAL GRIND WITH CIRCULAR RELIEF GRIND

THIS IS ALL DONE IN ONE OPERATION

Because the tool has been ground with the circular relief exactly the same as the curve of the tool, the outside of the tool is left convex. Therefore, all the metal possible has been left behind the cutting edge to give it maximum support, and the tool longer life.

The degree of clearance is determined by the distance the tool is moved in or out against the curved face of the grinding wheel.

Write for complete details.



Reasonable delivery

THE CLEVELAND TOOL ENGINEERING CO.

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"Let's Talk Shop!"

Special Tools from Standard Shapes

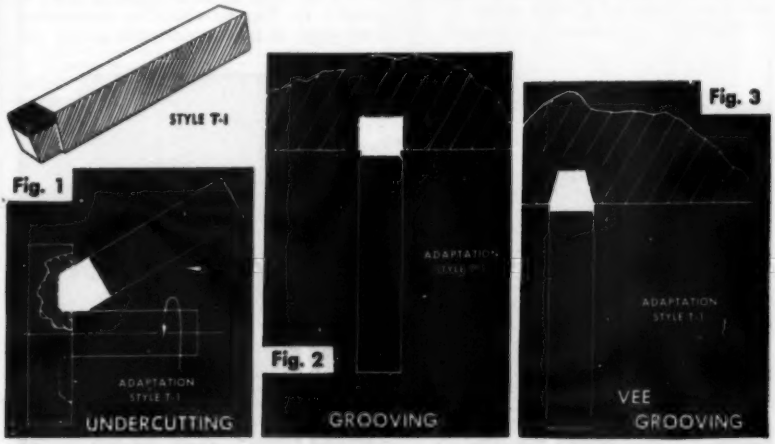
UNDER present conditions, with cutting tool producers under pressure to continuously increase output of tools, time delays in obtaining special tools have become somewhat aggravated. What most major tool manufacturers are doing today is concentrating as far as possible on "mass production" of standard tools—permitting greater output per man-hour and machine-hour, and bringing with it, particularly in the carbide tool field, major cost and price reductions.

One effect has been that many an ingenious shop man today, when in need of special shaped tools is purchasing "standard" varieties and converting such standard tools to special shapes by simple grinding operations. Usually, morever, it has been found that in addition to the faster delivery obtained on such standard tools, the cost of the tool plus the labor, etc. of re-grinding the tool to a special shape usually represents a much lower total than a specially designed, specially produced tool would have cost.

The accompanying illustrations, gathered from various plants in the country, show a few examples of how standard Carboloy tools have been applied to special machining operations.

Thus, Fig. 1 shows how a Style T-1 low cost standard tool has been converted to perform a special undercutting operation, the part being chucked in a lathe. Another variation for which the T-1 style tool is used is shown in Fig. 2. Here the tip end of the tool has been ground with a relief on each side, to provide clearance for machining a groove in an annular part. The corners of the tip are also slightly rounded for this operation.

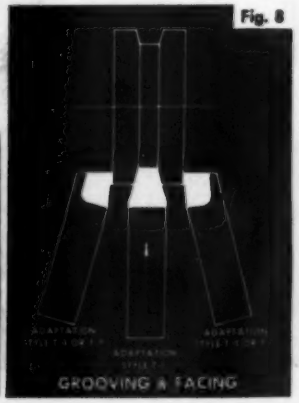
Two more operations with the converted T-1 tools—and formerly requiring "special" tools—are shown in Figures 3 and 4. The first shows a Vee



These typical jobs emphasize the economies which can be realized through alteration of standard tools, rather than purchasing special shapes.

grooving operation, for which the sides of the tip and tool have been ground off to the proper angle corresponding to the shape of the Vee. In Fig. 4, the operation consists of an undercutting operation on an annular part. The T-1 tool here has merely had its corners rounded and proper relief angles ground. In operation, the tool is fed into the rotating part parallel with its axis rotation until proper depth of cut is reached. It is then fed toward the center and then away from the center to produce the shape of the under-cut shown in the sketch.

Use of standard turning, forming and facing tools for boring operations is illustrated in Fig. 5. Here, a style T-4 tool has been cut off and mounted in the boring bar, after grinding proper relief angles required. Another adaptation of this general type of tool is shown in Fig. 6, where a chamfering operation is performed with a tool the



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BAND SAWING
BAND FILING
BAND POLISHING

LARGE OR SMALL — CUTS THEM ALL

Steel channel forms like above, equal to armor plate, 15 ft. long, 15" wide, formerly cut on a planer at Koehring Co., Milwaukee, are now cut on the DoAll at a labor saving of $16.50 each.

Group of dies and stampings (right) at Liberty Tool & Die Co., Rochester, N. Y., gives an idea of variety of jobs handled on their DoAll.

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Today's fastest method of removing metal—the DoAll cuts any kind of metal or alloy; from hardest high carbon steel to soft brass. Does internal and external band sawing, filing, polishing. Available are 42 different saws, 20 file bands and 3 polishers—a correct one to do each job more efficiently.

The DoAll effects spectacular savings in time and metal—takes the place of shaper, milling and lathe work in industrial and defense plants all over the world.

Ask to have a factory trained man call and show you what a DoAll can save in your plant.

FREE—*Literature and interesting 158-page Handbook on Contour Machining—well worth sending for.*

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Fig. 9

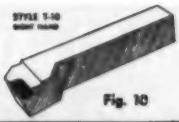

Fig. 10

Turning from a plunge start is accomplished here with a converted T-13 type of tool, as shown in Fig. 9. An adaptation of a T-10 style for turning with the tool mounted in the lathe turret is shown in Fig. 10. Fig. 11 shows a T-1 style tool altered to special form for machining a partially spherical seat.

Fig. 11

corner of which has been ground off to the correct angle.

Fig. 7 shows operation normally requiring two special tools. Here a style T-1 has been form-ground to produce the special shape required on the face of the part, while a T-7 tool has been adapted to a special turning operation requiring an angular setting of the tool.

Another operation in which several originally "standard" tools are combined is shown in Fig. 8. Here, the central tool is similar to that shown in Fig. 3, while the right and left hand tools used for facing the part are adaptations of Style T-4 and T-7 varieties.

Turning from a plunge start has been accomplished with a converted T-13 type of tool in Fig. 9, while an adaptation of a T-10 style for turning with the tool mounted in the lathe turret, is shown in Fig. 10.

Fig. 11 shows how a T-1 style, again, has been ground to a special form to permit machining of a partially spherical seat in the end of a part, using a simple plunge cut.

Lees-Bradner at New Address

A new plant location—West 121st St. and Almwood Ave., is announced by the Lees-Bradner Company, Cleveland, Ohio.

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STADOIL DIAMOND LAPPING OIL — Economical to use

The Only Product Designed Specifically to LUBRICATE DIAMOND WHEELS

GREATER WHEEL PRODUCTION MUCH LONGER WHEEL LIFE

TOOL FINISHES THAT WILL AMAZE YOU — FREE FROM SCRATCHES

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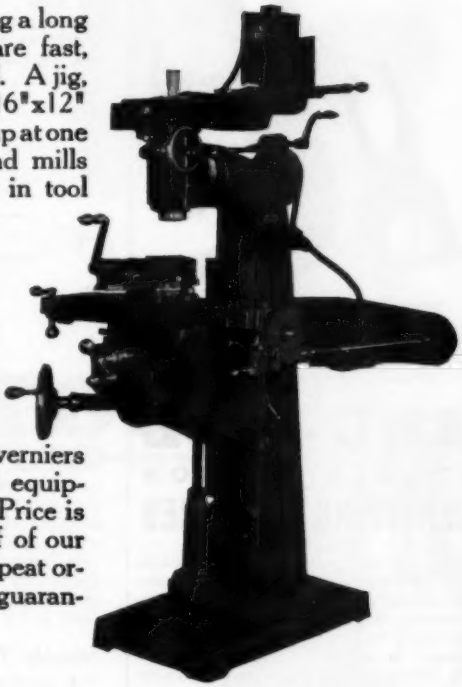
OVER 50% REPEATS
ON THESE MILLS

Index Mills are filling a long felt want. They are fast, simple and practical. A jig, die or fixture 8"x16"x12" high can be worked up at one setting by using end mills up to ⅝" diameter in tool steel. Dowel and bolt holes can be drilled. Other holes can be bored up to 3" in diameter. All milling and drilling and boring locations can be made accurately by use of verniers which are standard equipment on machine. Price is very low. Over half of our present orders are repeat orders. Satisfaction guaranteed.



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CLAMPING
with unyielding grip
and instant release

KNU-VISE PLIERS
Forging, hardened and tempered, 6 sizes

KNU-VISE "C" CLAMP
Three throat sizes: 5, 6, 10 inch. Jaw swings clear of work when released.

KNU-VISE
TOGGLE ACTION
CLAMPING FIXTURES

Once set for a job, Knu-Vise clamps and pliers can be put on and released instantly—no time is consumed in screwing to apply pressure and unscrewing to release clamp. Zip! and clamp is applied. Zip! and it's off. Initial setting of pressure remains as long as required.

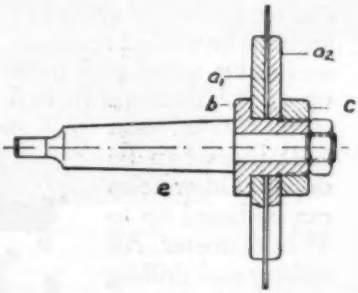
Bring real efficiency to plants where parts must be held together while drilling, welding, and other operations must be performed.

KNU-VISE
INCORPORATED
206 Grove Ave., Highland Park, Mich.

Morse-Cone Adapter

By Paul Grodzinski

The illustration shows an adapter which has been found very useful for the holding of thin sawing blades and small grinding wheels. When clamped in the usual way, it is very difficult to obtain a true running of these tools owing to the small bearing faces in the hole. This is at first avoided by clamping the blade between two flanges which leave only so much of the tool free as may be necessary for the cutting action. A further item is that the sawing blade, together with the flanges form a kind of sub-assembly which can be removed easily from the cone-spindle and eventually exchanged for another blade or tool. For this purpose the sub-assembly is mounted on a spindle b with collar, and the two flanges a_1 and a_2 are clamped together by a nut c. The sub-assembly is then fitted to the shank with Morse-cone e by another nut.



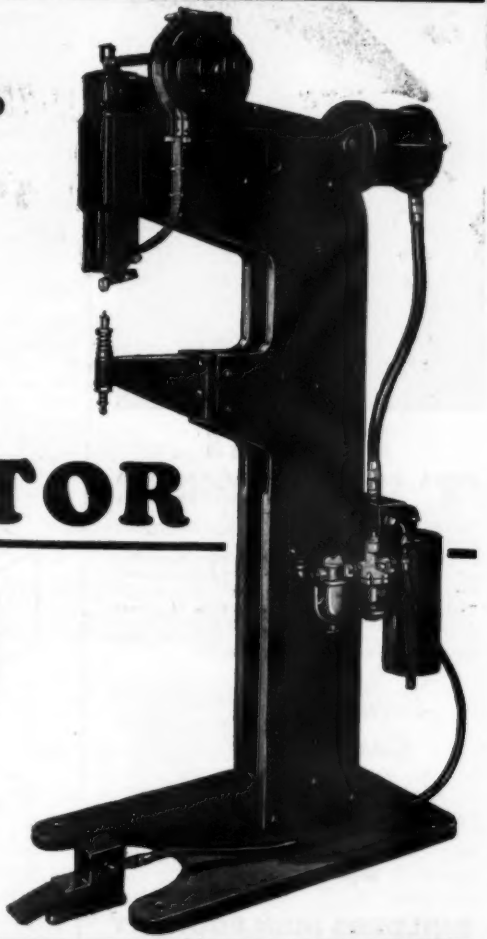
Simple Tool Carriers

A carbide tool carrier design which has proven extremely useful, according to Carboloy Co., Inc., in job shops, where a diversity of jobs requires availability at the machine of a fairly wide range of tools is illustrated in Fig. 1.

The kit allows for segregating the tools according to grade, style, and type of work on which used. Facilitating tool handling, such a kit may be kept intact or "loaded to order" in

handles *flush* riveting

AIR SQUEEZE ACTION plus AUTOMATIC FEED RIVETING for AIRCRAFT PRODUCTION



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1600 riveted joints per hour with no manual rivet handling. This is an average figure. Increased or lowered production depends on the ease with which the work can be handled.

it's simple

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this is a **TOMKINS-JOHNSON** *product*

BUILDERS
'T' SURFACE GRINDER

"We can do SMALL TOOL AND DIE GRINDING CHEAPER ON THIS MACHINE than on our large automatics which not only require greater set-up time but, due to over-travel and less flexibility, longer grinding time, too."

That, in essence, is what users tell us. Machines are moderately priced, so that it pays to install them at points convenient to the men who frequently have small grinding to do.

Send For Bulletin 644

BUILDERS IRON FOUNDRY
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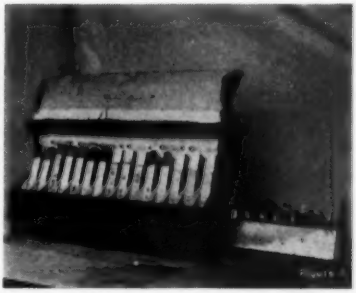
PROVIDENCE RHODE ISLAND

the tool crib and issued as a unit to the machine operator, thus providing, in addition, insurance against possible damage in taking tools to and from machines.



Two other types of tool carriers extremely simple to produce are shown in Figs. 2 and 3. These are designed for picking up and distributing of carbide tools generally. The first consists of a wooden block with holes drilled through and a board screwed to the bottom.

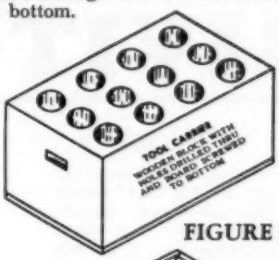


FIGURE 2.

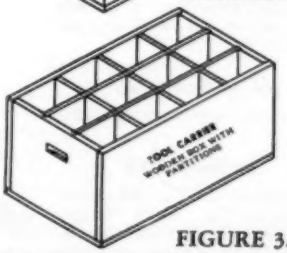


FIGURE 3.

The second is a wooden box with partitions, which may be used for

AN Immediate ANSWER to Metal Cutting Problems!

Wells SAWS
THE SIGN OF SERVICE

Now Built in 3 Sizes
No. 5—5" dia. round or 5" x 10" flat.
No. 8—8" dia. round or 8" x 16" flat.
No. 12—12" dia. round or 12" x 16" flat.

Also the No. 9 Upright Saw.

If you're faced with a metal cutting tie-up, here's a suggestion: Wells Metal Cutting Band Saws are quickly available to help you out. They easily and accurately cut almost any metal in almost any shape. You can use them for production, maintenance or odd jobs. Write now for details or call your mill supply house.

WELLS MFG. CORP., THREE RIVERS, MICHIGAN

either single point or end cutting tools. Separate boxes are recommended for handling carbide tipped milling cutters, shell and end mills, etc.

In one instance these kits are distributed to each operator and picked up daily for regrinding. Usually only a brief "touch up" sharpening is required.

Tool Record Book

By Frank V. Faulhaber

Bent on achieving the utmost in results from the tools that he himself purchases, one farsighted toolmaker keeps a handy record book wherein he enters all pertinent information. He finds this extremely helpful since he buys a wide variety of different instruments, some valuable and intricate, and he is a stickler for detail. If he buys a new micrometer caliper, he jots down the date of its purchase, the price, name and address of the source, together with other relevant data that may prove of future use.

He knows to a nicety just how many tools he has, and where he has them. He deems this particularly important as respects the more expensive tools. The record book enables him to determine instantly the number and kinds of tools he possesses. It is kept in a safe place, along with his instruments, in the tool cabinet. There is never any question as to whether a certain small tool, rarely used, is missing or not. The convenient record book serves also to remind him, from time to time, to check up on his equipment, which he can do easily and accurately.

When a special precision instrument must be bought, it is not an occasion for him to puzzle and worry just which make to buy; his handy tool record book supplies him with facts and figures. His memorandum shows where similar tools have been bought, to best satisfaction, and precisely what results have been obtained. The book also reveals the life and service of any given instrument.

Standardizing Nitrogen Container Valves

The G & N Mfg. Co., Cleveland, maker of die-casting machinery, has

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Precision lathes for doing most accurate turning, drilling, milling, threading, filing, polishing, in the tool room or in production.

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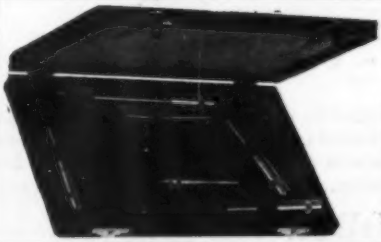

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Complete set $19.95

Consists of: 0-1" Micrometer, Outside. 1-2" Micrometer, Outside. 2-3" Micrometer, Outside (2 thimbles). 2½-4" Micrometer, Inside (3 measuring rods). Velvet Lined case.

Write for FREE descriptive Catalog.

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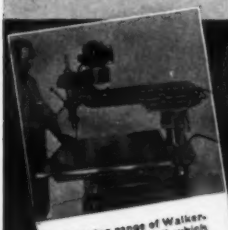

Showing range of Walker-Turner Radial Drill, which drills to center of 62" circle.

Head tilts up to 45° left or right.

For DRILLING TAPPING ROUTING LIGHT PROFILING

$355

(Including Motor)
Steel Stand $13.50 extra
F.O.B. Plainfield, N.J.

Jacobs Chuck ½" capacity on No. 1 Morse Taper. Spindle speeds: four—from 300 to 3000 r.p.m. with 1740 r.p.m. motor. Eight speeds—from 600 to 10,000 r.p.m. with two-speed 1740—3500 r.p.m. three phase motor with push-button control. Overall Dimensions: height 93", width 31", depth 58". Shipping weight 450 lbs. Ball Bearing Mounted, sliding ram carried on 8 precision ball bearings with provision for take-up for wear. Six-Spline Spindle: four precision ball bearings. Drive: pulley. Abrasive quality to eliminate belt slippage. Capacity: to center of 62" circle. Distance nose of chuck to table 13½". Traverse of spindle 20½". Column diameter 20". Arm rotates on column; may be tilted to 45° right or left. Drill press head cast in one piece. Runout accuracy guaranteed within all industrial standards. Extremely rigid when locked or drilling. Minimum perfect

• PROMPT DELIVERY to plants engaged in defense production

Versatile, speedy, accurate—Walker-Turner Radial Drills have made themselves indispensable to many Defense industries—aircraft, shipbuilding, tank manufacturing, tool making, and etc. In the interests of National Defense, first consideration in delivery necessarily is given to high priority ratings. Immediate shipment of these Radial Drills is made to concerns engaged in Defense production. However, our enlarged facilities and three-shift manufacturing schedule enable us to make reasonably prompt shipment to plants with low priority ratings.

SEND FOR NEW WALKER-TURNER CATALOG

WALKER-TURNER CO., INC.
1751 Berckman Street, Plainfield, N. J.

☐ Send complete details on Radial Drill
☐ Send complete Machine Tool Catalog

Name ..... Title .....
Company .....
Street .....
City ..... State .....

walker-Turner COMPANY INC. PLAINFIELD, N.J. U.S.A.

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FOR METAL, WOOD AND PLASTICS

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Milling Machine
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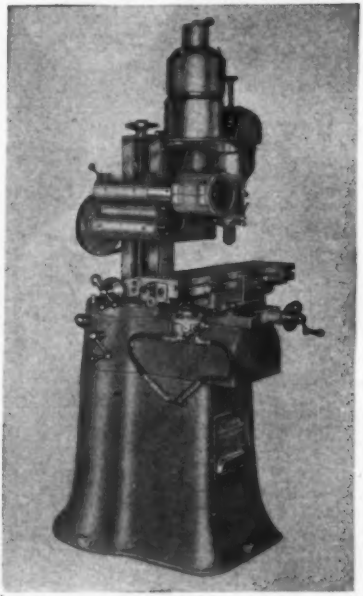


Note these features—

Horizontal and vertical spindles
Hydraulic feed converted to hand feed in 10 seconds
Countless feeds ½ inch to 8 feet per minute
Turret rotates full 360°
Vertical and horizontal spindles used simultaneously for parallel cuts.

Write today for new bulletin giving full particulars.

AIRCRAFT MACHINERY
CORPORATION
Burbank California

launched a campaign for mandatory standardization of valves used on industrial nitrogen bottles.

This action grew out of a recent disastrous explosion in a Cleveland die-casting plant. The explosion occurred after the accumulator tank on a die-casting machine had accidentally been filled with oxygen instead of the nitrogen which had been intended for it.

The oxygen came into contact, under pressure, with hydraulic fluid used in operation of the machine, and a chemical reaction was set up which caused the oil to ignite and burn at tremendous speed.

Directly responsible for this disaster was the fact that it was possible for a workman to release oxygen into the accumulator tank of the machine. If the valve on the oxygen bottle had made such transfer impossible, the mistake could not have been made.

G & N seeks to have the U. S. Bureau of Standards introduce a regulation making it necessary for nitrogen producers to sell nitrogen only in bottles with left-hand threads on the valve fittings. If this is done, all nitrogen inlets will have corresponding threads and it will be impossible to attach them to an oxygen bottle.

The danger of explosion through the contact of oxygen and oil is not limited to the diecasting industry. In the utility industry, for instance, both oil and nitrogen are used in contact with each other in certan types of generators, and were oxygen accidentally substituted for nitrogen an explosion would occur.

Similarly, some oil-filled power transmission cables are now being emptied of oil and filled with nitrogen, and here again if oxygen were substituted the oil would explode with disastrous results.

Appeal for action in this matter has been made to the International Acetylene Ass'n and to the U. S. Bureau of Standards, and these two organizations have taken it under consideration.

Standard Machine Tool Gray

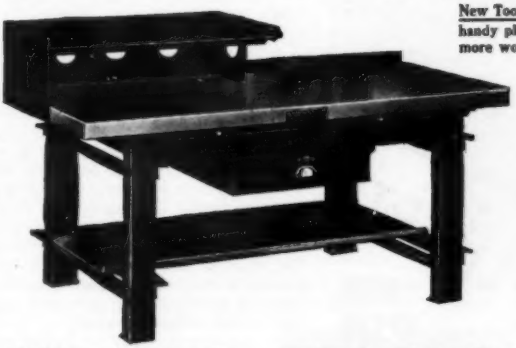
A new and lighter shade of "machine tool gray" has been endorsed by the National Machine Tool Builders' Ass'n.

WOOD TOPS WON'T DO

for "All-Out" Production

use CHALLENGE *Cast-Iron Top* WORK BENCHES

New Tool Box Shelf provides handy place for tool box . . . more work space on bench.



NO WARPING

NO SPLINTERS

NO FIRE HAZARD

● Old wood top benches just don't fit in today's industrial set-up! Modern plants, geared for peak production, need Challenge *Cast-Iron Top* Work Benches.

These benches remain rigid under heavy pounding and pressure and are equipped with leveling screws on full-length braces to assure a level surface. Tops and sides are at exact right angles carefully planed; undersides heavily ribbed.

Made in four standard sizes. Send for illustrated Challenge catalog. 432

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GRAND HAVEN Challenge MICHIGAN

THE New LIBERTY
HIGH SPEED GRINDING ATTACHMENT
Designed for quick, simplified setups for the best results in tool-room, die shops, and grinding rooms. Excellent for grinding gages, angles, slots, recesses and surfaces.
The Liberty High Speed Grinding Attachment eliminates needless time wasted in set up on surface grinders, as it takes but a few minutes to attach.
WRITE FOR ● FULL DETAILS
LIBERTY TOOL & GAGE
235 GEORGIA AVE. WORKS PROVIDENCE, R. I.

as the standard finish for machine tools.

Date of adoption of the new color standard is optional, permitting each machine tool builder to time the change from the old to the new standard as best fits his circumstances and his customers' requirements. Color cards of the new standard, known as "7-B," were sent to members recently.

Adoption of the new color standard followed a report by Wendell E. Whipp, President, Monarch Machine Tool Co., Sidney, Ohio, chairman of the Ass'n. Color Standards Committee, before the recent Annual Convention in Chicago.

In his report Mr. Whipp stated that a vote showed most machine tool builders in favor of a light color and that the trend among large machine tool users was toward a lighter color for machine tool equipment.

Mr. Whipp explained that although the new lighter shade shows up dirt and fingerprints more easily than the old, the factor chiefly desired by large machine tool users is good light reflection value. One large user, according to his report, had repainted all the machine tools in one shop with this lighter color and found a 33-1/3% better light at working height and also greater pride in machines and good operation on the part of the operators.

All suppliers have been advised of the change so that the new color is available from any paint manufacturer both in quick-drying spraying lacquers and in brushing enamels.

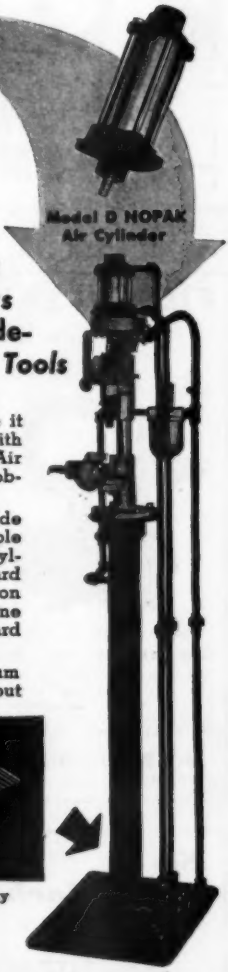
Screw Bolts for Pillow Blocks

By Paul Grodzinski

Little points and considerations in design frequently result in considerable savings in production and weight, and increased durability. The fixing screws for pillow blocks for vertical (or horizontal) loads are often arranged sidewise, as shown in Fig. 1. As the distance 1 is smaller than the distance a, the force which has to be taken up by the screws is greater than the actual load on the pillow block. This is clearly demonstrated by the relation $P = Q \frac{a}{1}$. Only a slight alteration in the form of the base plate results in a

Maybe YOU don't need Pneumatic Screw Drivers

. . . but this one illustrates how *NOPAK Valves and Cylinders* may be used to meet urgent demands for *Special Production Tools*



A "dust explosion" hazard in a certain plant made it necessary to develop a battery of screw drivers with spark-free motors and friction-free mechanisms. Air powered, air controlled, screw drivers solved the problem quickly, economically, efficiently!

Though *specially built*, these machines were made up largely of standardized units mounted on a simple base and pedestal. A standard Model D NOPAK Cylinder provides the vertical movement. A standard NOPAK 4-way, Foot Operated Valve provides precision control. Other "ready made" units are the Air Turbine for rotary power, Pressure Gauge, Lubricator, standard shafting and piping.

Here, then, is a new tool, developed with a minimum of new patterns, new castings, new stampings — without costly delays for special production. Similar applications of NOPAK Valves and Cylinders may help you lick a defense "bottleneck" in your plant.

Write for suggestions and literature.

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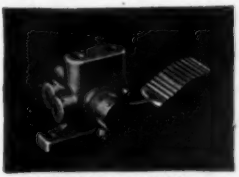
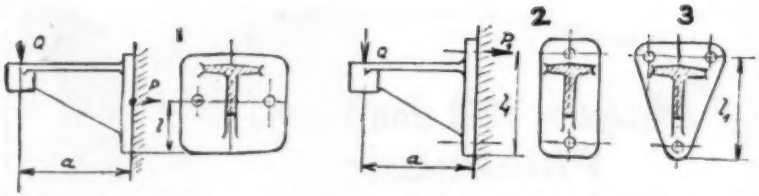


NOPAK 3- and 4-Way Foot Operated Air Control Valve

NOPAK VALVES and CYLINDERS

DESIGNED for AIR or HYDRAULIC SERVICE



better design, and as a matter of fact it is almost universally applied in commercial wall brackets and pillar brackets for power transmissions. By arranging the screw holes lengthwise, further savings in space and material (weight) are obtained. In this case, the two screw - bolts are differently stressed, the bolt on the top is highly stressed by $P_1 = Q. \frac{a}{l_1}$, but not so highly as the bolts in the former case, as l_1 is nearly double the former length 1; the load on the bottom screw can be neglected, if the top bolt takes the load. If this would be, perchance or by accident only partly the case, the bottom screw would be highly stressed, owing to the very small lever arm. A further improvement can be seen in a base of triangular shape, in which the two bolts are arranged on the top, dividing the load on each bolt by two.

Fig. 1 shows an arrangement that is not to be recommended. Fig. 2 and 3 show an improved arrangement of attaching screws.

Heat Treating Movies

A 15-minute preview of the new sound and color movie—"Heat Treating

FILING - SAWING
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for Accuracy
Precision

Reduce rejected parts by achieving new accuracy—accurate because table locks positively and the file is fixed in its stroke up and down. Made so work may be removed for inspection and returned without readjustment. Cuts small angles or to exact lines. Saves time because it is easy to "set up."

Check the Facts — Write for a Bulletin!

Motor has direct drive. Mechanism runs in bath of oil. Overarm swings back. Holddown adjustable —used to lock work for smooth cutting. ¼ H.P. G.E. continuous duty motor.
Price $125 complete with A.C. motor.

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Screw Machine Cams

IMMEDIATE DELIVERY

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Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

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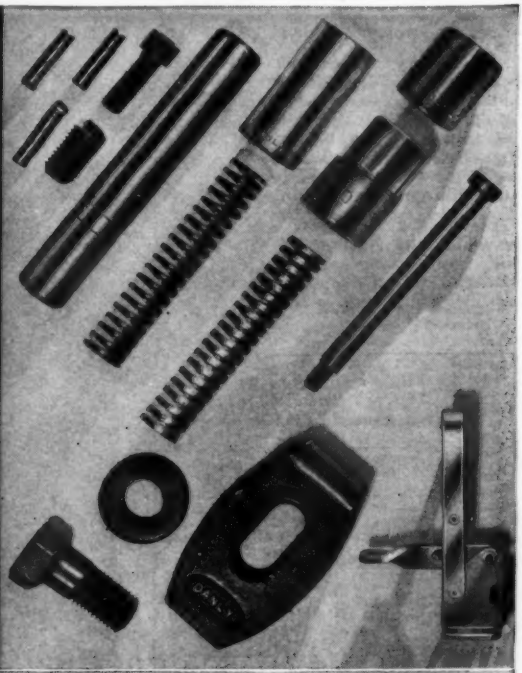

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Ducommun Metals & Supply Company, Los Angeles, California; San Francisco, California

DANLY DIE SETS and DIE MAKERS' SUPPLIES

Hints" was shown by Lindberg at the recent Philadelphia Metal Show. Filmed in the Lindberg plant, the movie was prepared in collaboration with members of the Lindberg staff who appear in the cast, demonstrating practical hints and tips for better heat treating.

The complete movie runs for approximately 40 minutes, and will be released for heat treater training and educational purposes Jan. 1, 1942.

Among the subjects covered are:—Straightening Methods, which includes both hand and mechanical press straightening, torch spotting, straightening from the quench, draw straightening; Tongs, Tools, and Tricks to help avoid distortion in handling high speed steel; Suggestions on Quenching, Etc.

Blackboard sequences are included, in which the fudamental principles of the subject being discussed are sketched out so that subsequent scenes are clear and easy to follow.

The work being handled is actual work in process. Because the movie is in full color, all scenes in which heated parts are shown are remarkably vivid. Voice of the Heat Treating Hints commentator makes clear each operation as it proceeds, so that even a novice heat treater can easily follow it.

A descriptive pamphlet has been prepared giving complete details on the movie. It tells how to make arrangements for showings at your plant or chapter meetings. Copy can be had by writing Lindberg Engineering Co., 2450 W. Hubbard St., Chicago, Ill.

Toledo Variable Speed Transmission

for

Variable speed control of V Belt driven equipment

Low in Cost
Easy to Install
Convenient Size
Simple to Operate
No Belts to Shift
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Types 1A and 2A Provide up to 3 to 1 Ratio With Power Ratings from Fractional to 4 H. P.

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All Types Available Either In Complete Assembly or Wheel Assembly Only.

If you have a variable speed requirement it will pay you to investigate these devices.

Write for literature and quotations.

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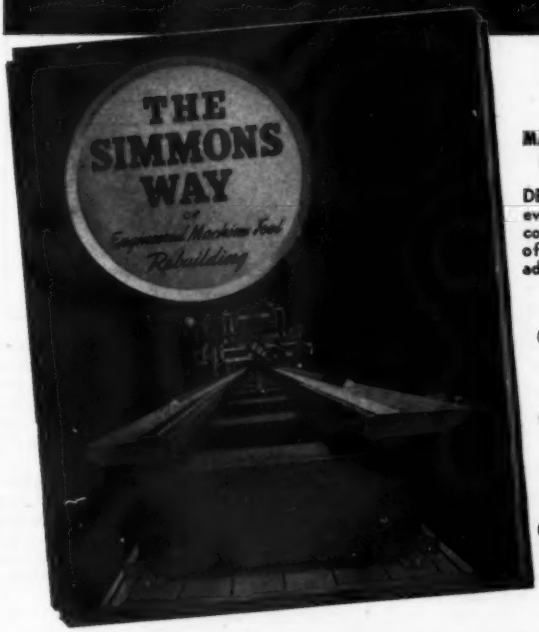

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DEFENSE PROGRAM requires every existing tool in working condition. Know how all types of machine tools can be adapted to current problems.

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- Reveals how Simmons motorizes obsolete equipment . . . installs Power Rapid Traverse to lathes, boring mills, milling machines and planers . . . and increases capacities.
- Shows how Simmons designs and builds special-purpose and standard equipment as a result of its wide rebuilding experience.

This 58-page catalogue illustrates today's most efficient methods of machine tool rebuilding. For the first time, through words and photographs, you have the complete answer to "What is a rebuilt machine tool?" Here you find photographic case histories of vitally needed machine tools rebuilt, re-designed and modernized by Simmons.

You who know the importance of your machine tools today should be familiar with this means of increasing their productivity.

A request on your company letterhead will place it on your desk.

SEND FOR IT To-day

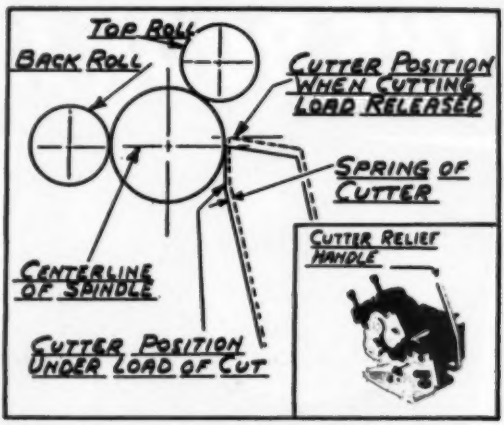
SIMMONS ENGINEERED Machine Tool REBUILDING

SIMMONS MACHINE TOOL CORP.
1725 NORTH BROADWAY, ALBANY, N. Y.

Eliminating Cutter Marks

Tool or cutter marks should be avoided when using box tools, especially when the piece is to be turned for size and finish.

Several theories are expressed as to what causes the marks. It is generally agreed that spring in the tool is the main reason, especially when heavier cuts are taken. After the cut is completed, the pressure on the tool is relieved and the tool springs towards the work causing the drag mark. To avoid cutter marks, most later model Bar Turners are provided with a tool relief slide allowing the operator to back the cutter away from the work at the end of the cut.



To avoid this condition on older model bar turners that do not have a tool relief slide, the turret lathe operator generally sets the cutter a little above center, about 1/64 of an inch, allowing the cutter to create its own tool relief.

For example, when the cut is taken, the spring of the tool moves the cutter to center. At the end of the cut, when the tool pressure is relieved, the cutter springs back to its original position above center, away from the finished diameter of the work.

(Courtesy — Warner & Swasey's "Blue Chips.")

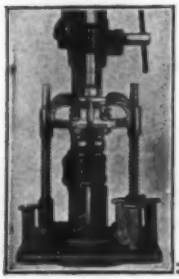
MORE COSTLY THAN GOLD—Tungsten filament wire found in a three-watt Westinghouse Mazda lamp is about 20 times as costly as pure gold, although it is worthless in a burned out bulb. Such filament wire has a diameter 1/10 that of human hair and has a value of $20,000 a pound.

2-MILLIONTHS OF AN INCH FLAT—A steel valve used by the Westinghouse Lamp Division to exhaust air from light bulbs has a surface so flat that its irregularities must be measured in light waves to within two-millionths of an inch. The steel is aged for several years.

LINCO *Two Spindle*
Adjustable Drill Head

Also Adaptable for Tapping

Drills two holes at once, made in several sizes, drill centers ½" to 6", speeds up to 3600 RPM, capacity drills 0" to 5/8". Total weight of small head, with aluminum gear case, only 9½ lbs. Equipped with roller and ball thrust bearings. Especially engineered for Canedy Otto, Demco No. 15 and similar drill presses—also suitable for use on larger drill presses.



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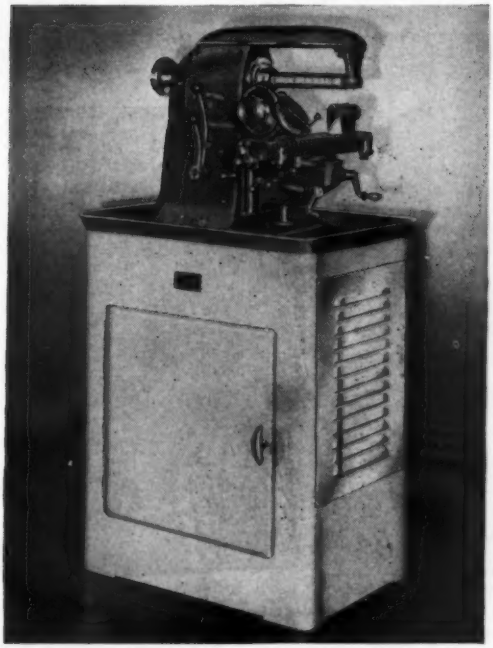

Precision

BENCH MILLING MACHINES

ELGIN TOOL WORKS

Division Of HARDINGE MANUFACTURING CO.

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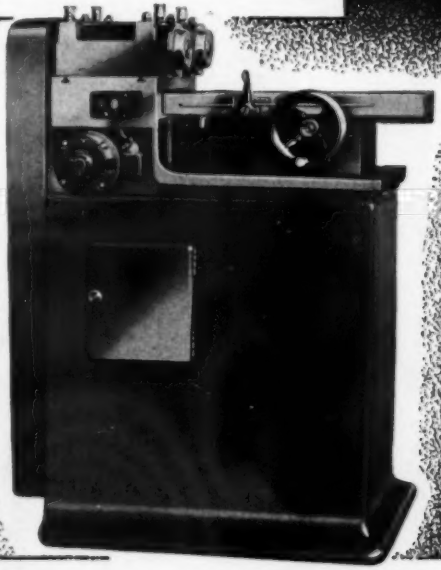
The Ultimate in Economy for Small Parts Boring



A great deal of Defense and general production boring is on small parts that do not require a large, expensive machine. Low-cost, flexible *Simplex* Precision Boring Machine No. 1 with one or two spindles is still the machine to buy for maximum economy and precision on small parts boring. Typical of the work which this machine is now doing are: precision bearings, actuating cylinders, generator end frames, machine tool quills, directional radio controls, and motor transport parts of all kinds.

The *Simplex* line includes a full range of over 25 types and sizes of precision boring machines. Write for boring machine catalogs.

STOKERUNIT CORPORATION

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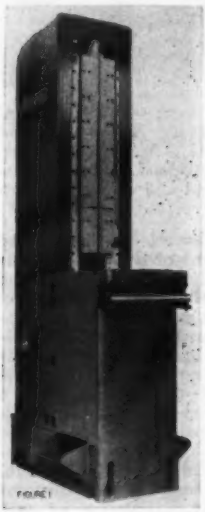
What's New in the Industry

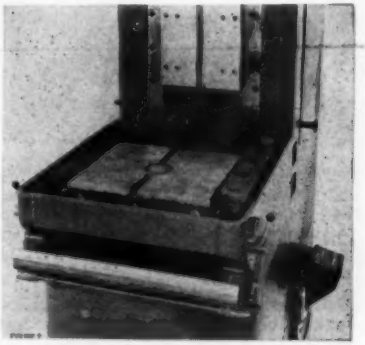
Colonial Single Ram Broaching Machines

INCREASED size of work table and ram, and new streamlined design feature an improved standard line of single ram broaching machines by Colonial Broach Co., 149 Jos. Campau, Detroit. Each machine is adapted to a wider range of tooling than formerly. Peak capacities have been increased and designed to give ample reserve power when operating at normal rated capacities. Normal capacities of the various sizes range from 3 tons and 36" stroke up to 25 tons and 66" stroke for the eleven standard models.



Column widths have been increased, permitting increased ram width on each of the machines which in turn provides better support for the wide bars frequently encountered in today's production requirements. In keeping with the increased width of the broach ram, the work platen has also been increased in width. (See Fig. 2.) The machines embody a new cylinder design using seamless steel tubing in connection with welded construction for leakproof operation. Another feature is the vertical mounting of the main drive motor inside column, reducing the amount of floor space needed for installation.

Improvements simplifying construction of the receding table mechanism allow for the effective installation of chip wipers, which protect bearing surfaces of the moving platen. The new design of table permits mounting of auxiliary units such as cams, etc., used to automatically operate clamps, locks, and support jacks on the fixtures. A standard Colonial feature, the patented cam lock and narrow center guide for receding table mechanism is incorporated in the new machines.



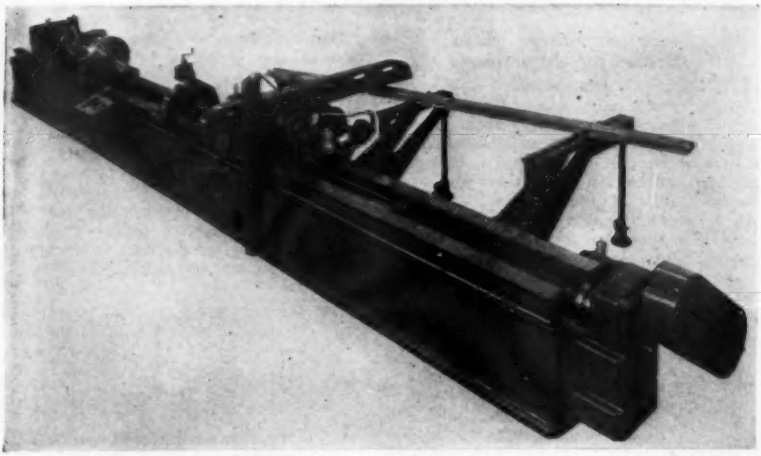
In larger machines of the new line a longer travel of receding table has been provided. Dual safety control and emergency knee bar (for quick stops) are supplied on all machines at no extra cost. Control is all-hydraulic on all machines. The lubrication system has also been improved.

Increased chip room and coolant capacity are obtained in the new machines without increasing their overall height. All machines are equipped with heavy duty, large volume coolant pumps.

Welded steel construction is utilized for major parts such as the column and table. The increased use of steel cast-

ings in fabrication of the machines combines the flexibility of cast design with the inherent advantages of welded structures.

No. 3 Deep Hole Rifling Machine



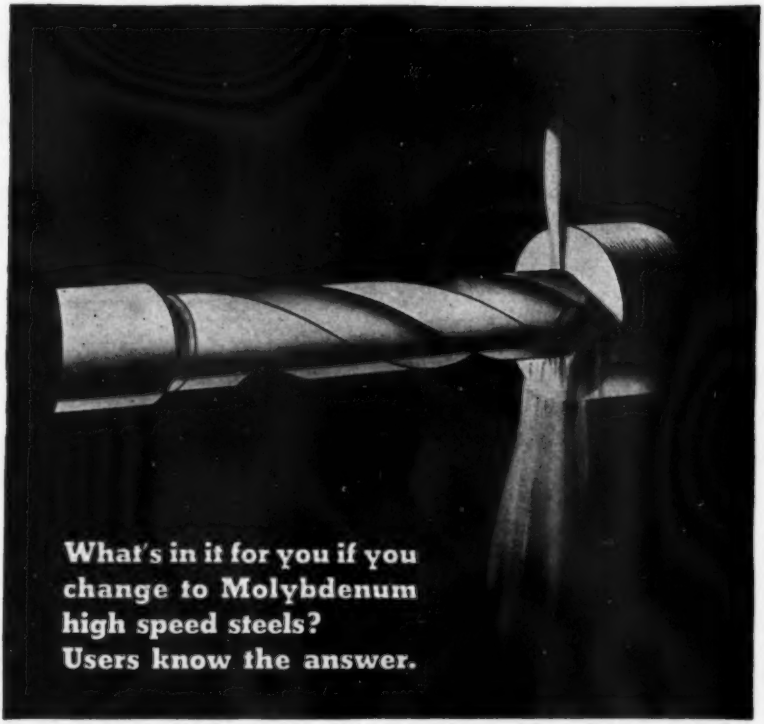
The Builders Deep Hole Rifling Machine consists of a rigid one-piece bed with means for holding, supporting and indexing the barrel to be rifled, and means for reciprocating and rotating rifling head.

A tubular type cutter bar, which can be suitably splined to the proper lead, carries the rifling head. The cutter bar is secured in headstock, drive for reciprocating the headstock being accomplished through a lead screw. The cutter bar is suported by a fixed guide and two movable guides. As the cutter bar is reciprocated, a hardened and ground swivel pin in the fixed guide engages in the spline and causes rotation of the cutter bar. The main drive is effected through a vee-belt drive from a reversing type motor. Limit switches at either end of stroke are tripped automatically to stop headstock travel.

Two push-button stations, in positions convenient to operator, individually control the motor, each station having five positions: — reverse, third speed, second speed, low speed and stop. By means of a four speed motor, the proper cutting speed is assured, together with a rapid and efficient return speed.

Indexing of barrel is performed manually by means of the index handwheel driving through a worm and worm wheel, causing the revolution of the dividing head upon which are inscribed index marks indicating positions of dividing head corresponding to the number of grooves to be rifled. A high presure oil pump driven by a motor, is mounted upon, and travels with the headstock. Oil is pumped from a reservoir located in bed of machine and delivered to cutting head for use as a coolant and for chip disposal. At beginning and completion of each cutting stroke, an electrical control automatically starts and stops flow of coolant oil.

Machine can be furnished with an adjustable sine bar so that a spline of



There are three good reasons for changing to Molybdenum high speed steels.

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2. Better toughness.
3. Lower cost.

The three advantages combine to reduce machining costs. Confirmation is found in the experience of thousands of shops that have changed over from Tungsten high speed steels.

Your tool steel supplier will give you information on the Molybdenum high speed steel analysis and heat treatment to meet each cutting requirement.

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Climax Molybdenum Company
500 Fifth Avenue New York City

MOLY

any desired pitch may be cut in the rifling bar. This sine bar may be removed from machine after splining the necessary rifling bars. The machine can then be operated with the sine bar or with splined cutter bar.

The machine is fitted completely with safety devices and guards for covering all moving parts.

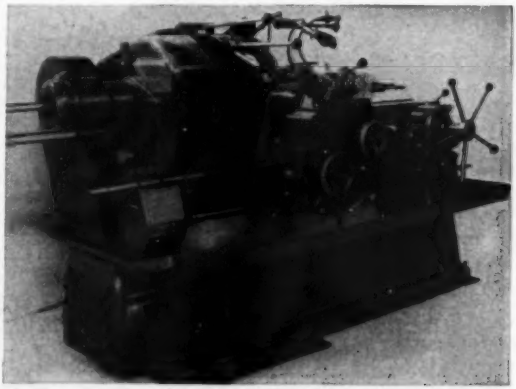
Length of machine bed varies according to length of the barrel to be rifled.

The four-speed motor provides speeds of 600, 900, 1200 and 1800 r. p. m. thus giving one cutting speed of 10′ per minute, one cutting speed of 15′ per minute, and another cutting speed of 20′ per minute, with return speed of 30′ per minute.

The machine is made by Builders Iron Foundry, Providence, R. I., and has a capacity of 105 mm. bore and rifling length of 156″. In addition, they make two other sizes of drilling, reaming and rifling machines, viz., the No. 1 for guns through .50 caliber, and the No. 1-A for barrels through 40 mm.

A New Merritt-Milholland Turret Lathe

A turret lathe with reserve power, strength and stability to handle the newer cutting tools at high speeds is offered by Merritt Engineering & Sales Co., Inc., Lockport, N. Y.



The makers emphasize that this is not a revamped obsolete model or just another turret lathe brought out to meet temporary abnormal conditions but a modern up-to-the-minute design.

The Nos. 4 and 5 machines are built with full cabinet base, described as an exclusive feature for machines of this size. A sub-base of new patented design is used for rigidity in alignment and provides for mounting motor under headstock.

Other features such as an 11″ spacing of the ways are said to give extra crosswise rigidity and stability to endure and counteract the torque stresses of cutting.

The hardened "V" ways are made with soft steel cores, — a feature claimed to eliminate residual stresses and make certain that the ways as originally installed will "stay put" and maintain their original accuracy.

A feature of importance from the standpoint of convenience, time saving and ease of operation is the arrangement of the cross-feed knock-out stops by means of which instant choice of four positions involving both forward and reverse feeds is effected by the turn of a knob.

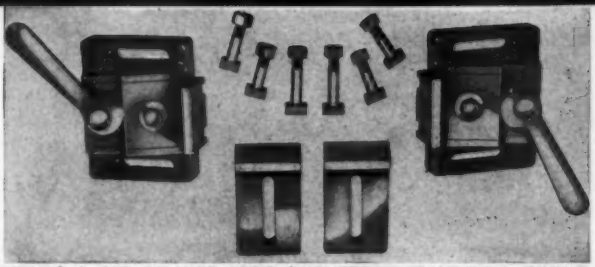
The headstock has 12 speeds forward and reverse, from 35 to 715 r.p.m. with automatic spindle brake and multiple disc clutch.

Printed specifications are available for a complete understanding of the numerous details.

Machine Products Bulletin

"Precision Surface Plates, Angles, Cubes—and wheels handles & knobs" is the title of a new 4-page folder just issued by Machine Products Corp., 6769 McNichols Rd., Detroit, Mich. It shows photographs of all the items mentioned in the title, along with mechanical drawings, sizes and prices. Prompt deliveries are promised.

QUICK ACTING VISE JAWS



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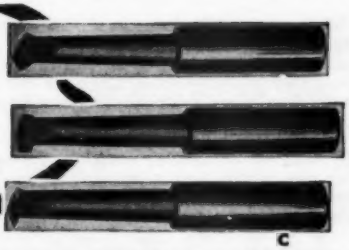

(A) For Internal Boring (B) Facing and Bottoming (C) Internal Threading

Made in wide range of sizes. (The small sizes shown above. The larger sizes come with cutting heads screwed securely to high-tempered shanks of special alloy.) Style A Boring Tool will outlast six normally-forged tools. Style B specially suitable for use on turret lathes and automatics. Especially adaptable for recessing. Style B has advantage of cutting cleanly a wide range of different threads in smallest borings imaginable. Also available with carbide tips.

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BOKUM TOOL COMPANY 49 W. HANCOCK AVE. DETROIT • MICHIGAN

Micromatic Hydraulic Honers with Automatic Size Control

Micromatic "Hydrohoners" in two basic models are announced by Micromatic Hone Corp., 1345 E. Milwaukee Ave., Detroit. These machines are high production units which are claimed to accomplish four results in one process:—substantial stock removal, rapidly and economically; uniform diameter size within low tolerance; dimensional accuracy within extremely low tolerance; and any desired degree of planar surface smoothness. A Hydrohoner will not only finish bores but will also finish external surfaces on work pieces which can be chucked on the spindle.

Automatic "Micr-O-Size" Control is asserted to make completely automatic operation successful in high production for the first time in honing. The manufacturer points out that this control unit generates accurate sizing, in

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OPEN

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

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SPECIFICATIONS:
Open Width 1/8" to 6"
Gage Material .040 to .125
Pin Diameter .101 to 3/8
Lengths to 120"

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SEMI-OFFSET

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SAVES TIME AND INSURES ACCURACY FOR MACHINE TOOL MAKERS AND USERS

SIZE—5½"x12"
WEIGHT—12½ LB.
GRADUATIONS .0005" PER FOOT
PRICE, WITH WALNUT CASE, $84.00 NET

SPECIAL TYPES AVAILABLE FOR PERMANENT MOUNTING.

This instrument is specially designed for use in the manufacture and maintenance of precision machines. It is very rigid and durable. The glass is ½" thick and is not sensitive to changes in temperature. Graduations are on the under side of the glass to eliminate error in redaing.

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high production, uniformly within limits from .0002" to .0005". Visual dials are provided for set-up, adjustment, and complete operating control.

Additional features of Automatic Micr-O-Size Control are instantaneous abrasive expansion only to average rough bore size; controlled, uniform rate of expansion feed-out; and expansion collapse always to same starting diameter.

These Hydrohoners are adaptable to the honing of countless parts in the automotive, aircraft, and other precision fields. Dozens of examples of parts being "Microfinished" are shown in the manufacturer's bulletn AR-60. Work-holding fixtures specially designed for the Micromatics are available.

A manual Micr-O-Size unit is available for low production applications. It is particularly suitable for meeting the varied needs of tool room use.

Both models are offered with one or two spindles and a work capacity of ¼" to 6" in length. The Model 100 (shown at left in illustration) handles work ranging in diameter from ¼" to 1". Table is 12"x12" and spindle is 5" from table. Capacity of Model 200 is 1" to 2" diameter. Table of this model is 18"x18" and spindle height 7½".

Protecting Fingers

A practical finger guard, or finger stall, combining tough leather and flexible lastex has been designed by the Industrial Gloves Co., Danville, Ill. It is comfortable, clean, easy on, easy off, light weight and durable. Gives protection on fingers and thumb, in any combination, to buffers, polishers, sanders, grinders, press operators, assemblers of small parts, etc. May be worn under glove for extra protection. If worn with leather on back of finger, protects knuckles from raps, cuts, abrasions. Illustration shows grain leather and lastex combination. May also be had in heavy split leather, light weight kid leather or wool felt.

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Wet wheel cutting will produce burn and burr free cuts in high alloyed hard steel and many other materials. Tubing to 3", Solids to 2". Prompt Delivery!

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You can simplify CONTOUR CUTTING by using Atlantic narrow sized blades with one temper only. They are best for cutting any and all metals and are used on all makes of band saw machines.

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Permits easy withdrawal to length desired. 100' lengths.

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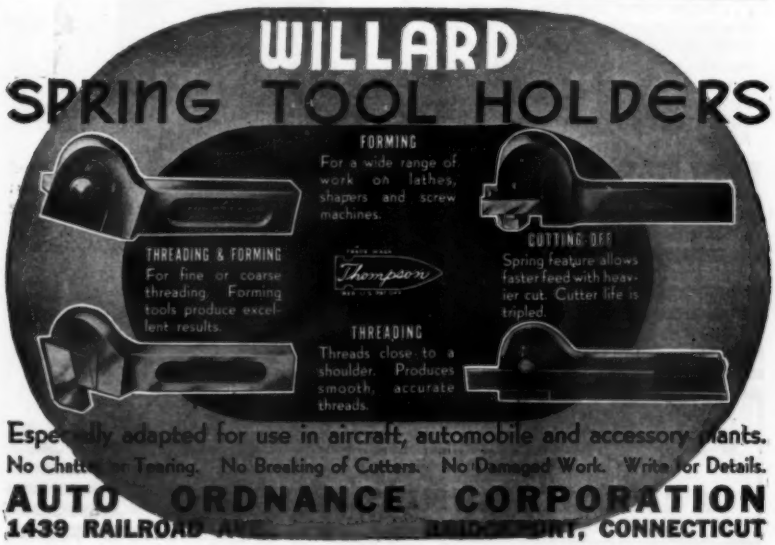
WILLARD SPRING TOOL HOLDERS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Spring feature allows faster feed with heavier cut. Cutter life is tripled.
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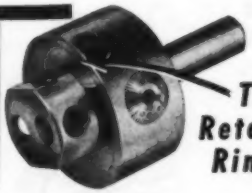

This Retaining Ring on

FRAY Micrometer OFFSET BORING HEADS

. . . helps carry the load thrown on the tool carrying block—keeps chips from micrometer mechanism—eliminates sharp corners that might catch on operator—maintains full strength with all the advantages of round construction. An *exclusive feature.*

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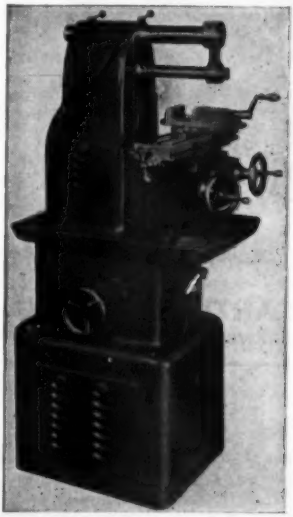
Maker of "ALL ANGLE"
Milling Machines and Milling Attachments

Vernon No. 0 Milling Machine

A new compact horizontal milling machine, the Vernon No. 0, is announced by Machinery Mfg. Co., 1915 E. 51st St., Vernon, Los Angeles, Calif. It incorporates the following features standard on all Vernon horizontal mills:—



Bronze clamping shoes with hardened steel screws with individual hand levers for instant and positive locking of overarm. Overarm bracket for supporting arbor can be set next to cutter;

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Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

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HEAVY DUTY REX SPOT WELDERS

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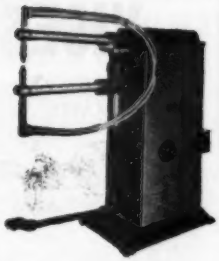
PROMPT DELIVERIES



At surprisingly low cost—The REX All Automatic Butt Welding Attachment.

For quick conversion of the REX or other spot welders of the rocker arm type—

Write for details and price.

The REX Spot Welders self contained steel cabinet units — Adjustable - swivel lower arm—Upper arm adjustable in and out.

Foot—air or motor operated—Rocker arm and press type design. 10 models.

Underwriters' approved.

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For Factories, Machine Shops, Foundries.

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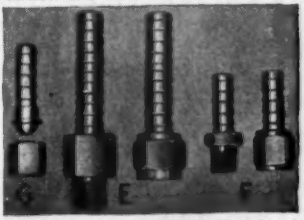
The only air gun with enclosed lever that operates valve thru ball and socket joint. Leakproof—no packing gland. Saves air. No external levers or buttons. Simple, compact design. Long service—less maintenance. Priced low.

Made of bar brass and stainless steel. Sizes for ¼" to ¾" air hose.

Many types for all requirements. Thousands used with outstanding success. Shipped promptly from stock. Catalog on request.



Fittings for Air and Welding Hose. Standard and extra long shanks. Shipped from stock. Catalogs on request.

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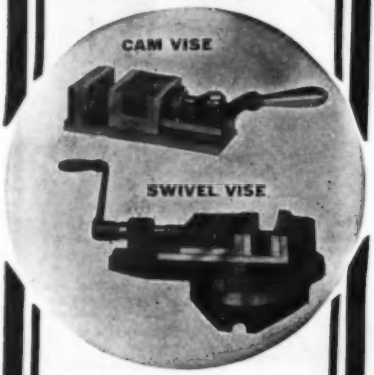
"MODERN" VISES



"MODERN" VISES are precision-built with hardened and ground jaws for rapid production work on milling machines, shapers and drill presses.

CAM VISES—Jaw Dimensions: width 4" or 5", depth 1½", maximum openings 2" or 3".

SWIVEL VISES—Jaw Dimensions: width 4", depth 1½", maximum opening 3". Can be used without base.

Write for folders.

MODERN TOOLS,
EAST BERLIN CONN.

Manufacturers of precision high speed steel and carbide cutting tools.

in this way extra heavy cuts can be taken without chatter, it is pointed out.

Spindle is of heat-treated steel and ground. It is mounted in Timken tapered roller bearings, permitting adjustment for wear. All bearing surfaces are handscraped. Dovetails of knee, column and table are handscraped and spotted.

Dials are easily adjusted. Cross and longitudinal screws are mounted in double row ball-bearings. Tapered gibs throughout are readily adjustable for take-up of wear. Larger knee is of sturdy box-type construction with exceptionally long bearing surfaces on vertical ways.

Fully enclosed variable drive gives correct spindle speed for job, is instantly controlled by hand-wheel conveniently located at side of machine. "B" section Vee belts are used. Motor bracket is "spring loaded."

Fabricated steel pedestal supports machine and fully encloses entire drive mechanism. Universal vertical milling attachment and longitudinal power feed are available as extra equipment.

Some of the specifications are:—hole through spindle, 9/16"; speeds 100 to 1000 r.p.m. or 150 to 1500; longitudinal feeds, 10 or 12"; transverse feed, 5½"; distance table to spindle 9¼"; table is 5½"x20"; width of vise jaws 4", depth 1 7/32"; motor recommended, 1 h.p. x 1750 r.p.m; height overall is 60". Floor space required is 29"x39" and net weight is approximately 750 lbs.

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TIME SAVING CLAMPS

PECO CLAMPS are the only clamps with drop forged handles and bars. They're engineered for production-speed and operating ease—are faster, hold tighter, last longer. Cost far less than individually designed equipment. Send for illustrated catalog describing complete line of PECO Clamps and other PECO Production Equipment.

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Extra Large V way. Disc type clutch transmission. 48", 72", 90", 110", 134".

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Infra-Red Motor Repairs

The effective use of radiant energy in electric motor repair work is a recent innovation. Drying of water-soaked motors is reported to be quick and easy with near infra-red. Preheating of motor parts, coils, etc. is said to be only a matter of a few minutes when radiant energy is used. Insulating varnishes can be baked fast and well with heat lamps, because the baking is from the inside out.

Recent records are reported to show that a 3 h.p. stator can be baked 1-¾ hours and No. 801 G. E. coils also may be handled in the same time.

The Fostoria Pressed Steel Corp., Fostoria, Ohio, now have made available two motor-baking units to accommodate the needs of various size motor shops.

These two new models are known as MBU-832-QR and MBU-416-IR. The former has 32 Para-Sphere reflectors mounted on the flexible arm frame and will accommodate parts up to 37" in diameter. The unit comes completely wired. Using 250 watt lamps, the total load is 8 Kw.

Model MBU-416-IR uses 16 reflectors and each arm is wired separately, plugging into a common junction box, making possible the use of any combination of the reflectors. The total load of this unit is 4 Kw. Motor and armature jobs that are too large to permit easy moving can be handled easily by flexible Para-Sphere equipment taken directly to the job. Bulletin PS-31 gives a further description of electric motor-baking.

Turn a Hole Inside Out?
IMPOSSIBLE

The Wappler Industrial Telescope will help to solve your difficult inspection problems. Four types of vision are available for the examination of hard-to-get at places. The surface finish of internal shoulders, bores, holes and pockets may be readily scrutinized by means of the appropriate type inspection telescope.

Send us details of your problem with a blueprint of the parts involved. Write to Industrial Division for illustrated booklet.

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LESLIE HAND PUNCH PRESS
MOST CAPACITY
POSITIVE ALIGNMENT

Max. cap. 2⅜ dia. hole thru 10 ga. iron, proper shear on punch, throat depth 6". Takes punch press dies up to 3"x6¼" in area. Leaf arm gives perfect alignment without ways or leader pins. Portable.

Ask your dealer, or write for circular.

LESLIE WELDING CO.
2947 Carroll Ave. Chicago

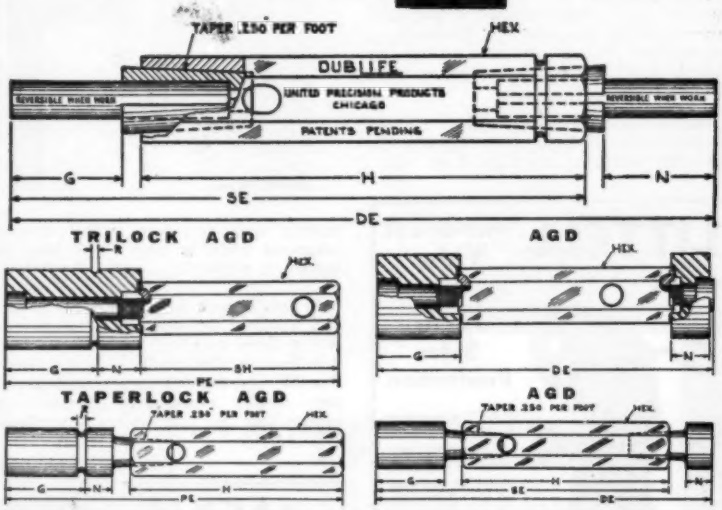
Plastic Hammers

A new line of plastic hammers, specially developed for tool and machine shop use, was recently introduced by Rapid Mfg. Co., Glendale, Cal. These hammers have many applications in tool and die shops, as well as in machine production, as any metal or plated surface can be struck a full blow without being marred.

All but one of the "Rapid" hammers have replaceable tips of transparent amber "Pyralin," a DuPont Company cellulose nitrate plastic that is so tough it resists chipping or scratching. The handles are of seasoned hickory, securely wedged and keyed in solid steel heads so they cannot twist or turn. Model No. 25 is made of laminated sheets of "Pyralin," with transverse laminations at the tips and can be sawed into any desired shapes.

Rapid plastic hammers range in weight from 3 ounces to 18 ounces, and are available in all standard peens.

The New **DUBLIFE** *Gauges*



United Precision Products, exclusive manufacturers of Plug Gauges, announce a new improved DUBLIFE Gauge. The handle is made of hexagon material with bronze tapered collet which locks around the plug as it is driven into the handle. The plugs are reversible, so that when one end is worn the other end can be used, thus giving double life. 30,000 gauges in stock ranging from .030" to 1".

A new catalog showing DUBLIFE and AGD Gauges will be sent to those requesting it on company letterhead.

UNITED PRECISION PRODUCTS CO.

4618 W. HURON ST., CHICAGO, ILLINOIS

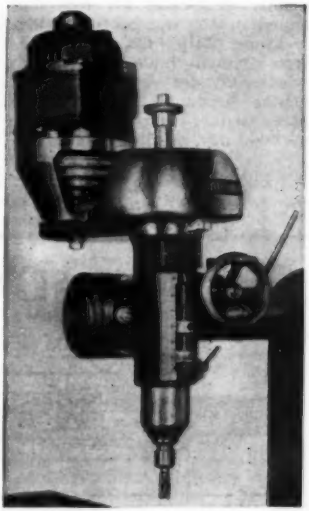
Quill Type Heavy Duty Milling Attachment by Rusnok

Specially designed to meet the demand for heavier duty end mill operations, Model ST vertical milling head attachment is offered by Rusnok Tool Works, 1845 W. Carroll, Chicago. This motor driven head has movable quill and is useful for milling, boring, and drilling.

The Model ST is described as highly versatile, using many types of cutters on a wide range of work. End mills from 1/16 to ¾" are accommodated; quill travel is 4".

This new Rusnok head has a large size spindle which is hardened and ground and has No. 9 B. & S. taper. Spindle is mounted on precision tapered roller bearings and driven by a six-splined pulley drive. Aluminum pulleys provide six speeds ranging from 250 to 3,000 r.p.m.

The makers emphasize that rugged construction is employed throughout, assuring smooth cutting, free from chatter and vibration. The counterbalanced quill is large and long and lapped to a precision fit in the housing.



A quick rack feed is lever-operated and a wheel provides fine worm feeds. Worm feed may be engaged or disengaged with the quill in any position. The ST also features a locking micrometer depth stop and positive quill lock. The ½ h.p. motor operates at 1725 r.p.m.

LITTELL **Air-Blast Valve for Faster Safer Production**

PAYS its cost in a few weeks time in — increased production — greater safety — economy of air. Automatically ejects pieces. Operator's hands are never in danger zone. Quickly adjustable air nozzle.

Automatic Roll Feeds—
dial feeds, magazine feeds, hopper feeds, for punch presses. Reels for coiled stock. *Send for Circulars.*

F. J. Littell Machine Co.
4153 RAVENSWOOD AVE., CHICAGO, ILL.

ALPHIL
Spot Welders
More Production Lower Cost!

Features include: transformer which guarantees faster heat, stronger welds; water cooled electrodes and tips; automatic trip switch; adjustable arms; swivel pedal; and heat regulator.

If you have any production problems — *consult us.*

Alphil Spot Welding Co.
431 W. Broadway, New York, N.Y.

L-W LATHE CHUCKS

4 JAW INDEPENDENT L-W LATHE CHUCKS

Semi-Steel body, ribbed construction, hardened and ground steel reversible jaws—Made to stand the gaff. We are proud to offer such Hi-quality at low cost.

10" Size	$33.45
12" Size	38.30
14" Size	43.45
16" Size	55.60
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Send today for new free catalogue.

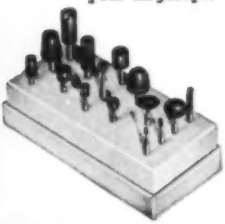
Also Mfr's. of
Magnetic Chucks
Demagnetizers
Milling Machine Vises
Power Hack Saws
Dividing Heads

L-W CHUCK CO.

1-7 N. ST. CLAIR ST., TOLEDO, OHIO

ACCESSORIES

● That's right, and here's how: The Handee line is the most complete ever offered to fit items to add to their usefulness and versatility. Look over the cross section shown here you to do some special job faster and better—how a hundred of them save precious time your fingertips. Most items can be shipped promptly. Send for catalog.



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A popular selection of 15 of the most practical shapes and sizes.

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No. A-4 WHEEL Mounted on ¼" mandrel. **78c**

No. A-21 WHEEL Mounted on ¼" mandrel. **54c**

No. A-38 WHEEL Mounted on ¼" mandrel. **45c**

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No. 5904 STEEL CUTTER on ⅛" shank **85c**

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No. RF-219 STEEL CUTTER on ¼" shank **$1.50**

No. RF-152 STEEL CUTTER on ¼" shank **$1.50**

STEEL CUTTER SET No. 3041

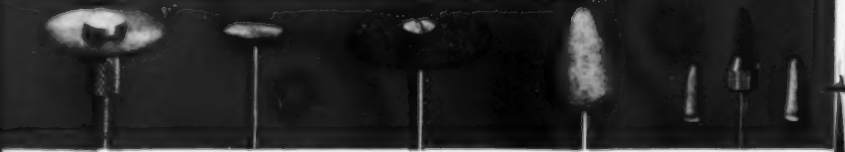
12 selected Cutters mounted on ⅛" steel shanks.

$9.00

No. 3042

12 selected Cutters mounted on ¼" steel shanks.

$17.00



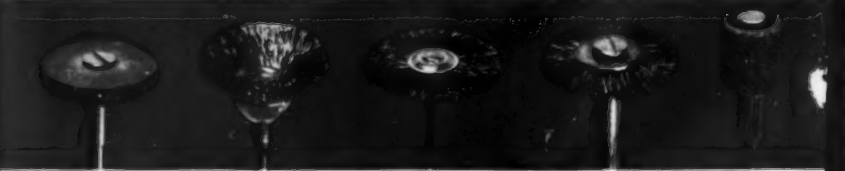
No. 27 SAW—1½" diam. .023" thick, ⅛" hole. Saw only, **75c**

No. 20 SAW—1½" diam. .033" thick. Mounted on shank, **75c**

No. 3019 Cutting Disc, of rubber. 1½" diam. ⅛" thick, ⅛" hole, **40c**

No. 31 Polishing Tip of felt. For intricate work. Without mandrel, **20c**

No. 3050 Grinding and Polishing Kit. $2.00



No. 29 Polishing Wheel. Soft rubber. ¾" diam., ⅛" thick, ⅛" hole. Without mandrel, **20c**

No. 12-S Wire Cup Cleaning Brush on ⅛" mandrel, **75c**

No. 15 Wire Scratch Brush 1" diam. On ⅛" diam. shank, **50c**

No. 49 Wire Brush Extra stiff. 1" diam. **$1.00**

No. 34 Drum Sander, ½"x½" drum on ⅛" shank, **75c**

YOUR

d to fit all portable power tools—300 different stock
n here. Consider how this or that one will enable
ous time and give you a storehouse of efficiency at

CHICAGO MOUNTED WHEELS

OF V/T SUPER BOND

This remarkable new bond is the talk of the industry, because wheels made from it actually have 150% to 300% longer life than ordinary wheels. Ask for a free wheel to make your own test—you'll be amazed with results.

HI-POWER GRINDER

Has perfect balance. Will drive a 2½" diam. wheel smoothly, at a speed of 17,000 r.p.m. Weighs 3 lbs. Comes in wood case with 3 Chicago Mounted Wheels, Drum Sander and Bands, 2 Collets, Wrenches, Dressing Stones, $38.50.

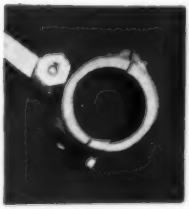
PRECISION DRILL PRESS

Here's a sensitive press in which the DeLuxe Model Handee can be mounted and held firm to drill holes from ⅛" in diameter to the very smallest. Sturdy work table measures 3½" in diameter. Without Handee $15.50.

HANDEE ★ TOOL OF 1001 USES

The little "Caesar" of power tools. Uses 300 accessories to grind, drill, polish, cut, rout, carve, sand, saw, sharpen, engrave, etc. Plugs in AC or DC socket. Speed 25,000 r.p.m. Weighs 12 oz. 18.50 postpaid with 7 accessories.

TOOL POST ADAPTER



No shop should be without the DeLuxe Model Handee in one of these convenient Post Adapters. For grinding small holes and as a help-out unit on any standard lathe, it just can't be beat. Adjustments for accurate set-up rigidly held. $2.50.

IMMEDIATE DELIVERY

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Send for either model today and try it for 10 days in your own plant on your own work.

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Name.....

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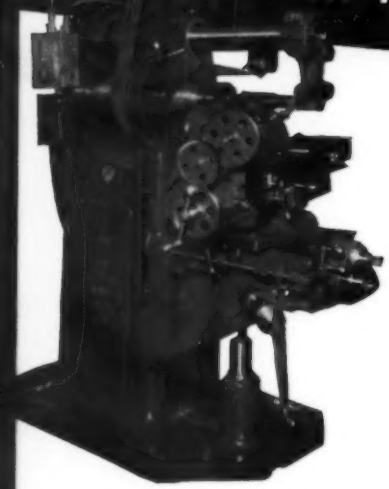
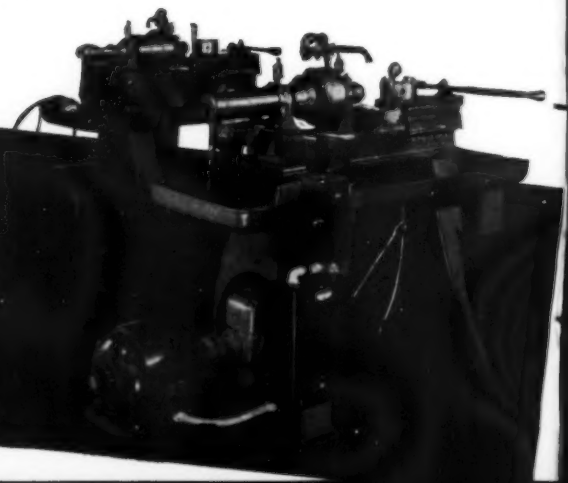


Drive-All Units will make your machines more efficient. Write for information. Representatives in leading cities.



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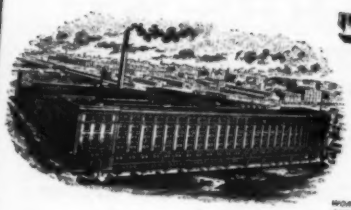

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November 3, 1941

Drive-All Mfg. Co.
3400 Conner Ave.
Detroit, Michigan

Mr. Haskell

Gentlemen:

Attached is a photograph of the No. 1 turret lathe with your gear box installed. Except for the motor cover that has been taken off to show your unit and the belt guard that has been removed from the spindle, the machine is ready to operate. Before we finish up, we ought to be able to take a picture of No. 2 machine as well, and when we do have a picture of it, I will send a copy of this to you.

In talking to the British Purchasing Commission the other day, I learned that they are quite pleased with this arrangement and as I told you, our experience so far with this drive has been quite satisfactory. We had some concern that the No. 2 machine might be a less successful installation, but it seems to work out just as well. The tested motor and gear box which we have reversed thousands of times has been entirely satisfactory so far as our engineers are concerned.

Very truly yours,

THE WARNER AND SWASEY COMPANY

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Enc.

Nearly 4000 TYPES of CASTERS & WHEELS

- Reduce Floor Wear to a minimum.
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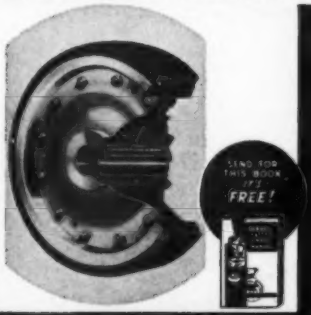
- Save time, speed up production.

DARNELL CASTERS & E-Z ROLL WHEELS



DARNELL Corporation, Ltd.
LONG BEACH, CALIFORNIA
36 N. CLINTON ST., CHICAGO, ILL.
60 WALKER ST., NEW YORK N. Y.

"Tool Steel for the Non-Metallurgist"

A booklet entitled "Tool Steel for the Non-Metallurgist" is offered by the Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.

This 32 page (5½x7½) bulletin discusses in a popular way the characteristics of the different types of tool steel, oil hardening, air hardening and high speed steels; heat treatment, quenching and tempering with some pertinent suggestions on grinding.

Sundstrand General Catalog

Descriptions and principle specifications of Sundstrand machine tools are contained in Catalog G. C. 1, a general catalog announced by Sundstrand Machine Tool Co., 2535 11th St., Rockford, Ill. Machines offered include hand, hydraulic, and mechanical feed "Rigidmills"; single spindle automatic lathes in three models; semi-standard or entirely special machines; centering machines; and auxiliary equipment.

—GEARS—

Spur—Helical—Worm—Bevel—Miter, Etc.

We do broaching and all kinds of grinding.

We specialize in grinding hardened steel bushings, cam rollers, etc.

Prompt service and quality has retained a large list of customers for 25 years.

TAYLOR MACHINE CO.
1919 E. 61st St., Cleveland, Ohio

"Tool Design"

A timely book on tool design is announced by American Technical Society, 850 E. 58th St., Chicago. A 481 page book with 440 illustrations, "Tool Design" is intended to fill the needs of beginners and also to help experienced men solve their design problems.

It can be used by ambitious men for self-study and reference or as a classroom text. Quiz questions at the end of each chapter add to its usefulness.

One feature of this book is that the drawings have all been taken from the production field. In most cases they are actual tool designs and, therefore, contain a wealth of information for the expert as well as the apprentice. The drawings have been selected to cover a wide field, and the typical designs that are presented illustrate principles that find many and varied applications in other tool designs. These drawings show the reader the sizes and kinds of materials and how general applications of principles are determined and carried out.

The author, Charles B. Cole, M. E., has had years of experience. As president of a tool sales company in Chicago he markets tools to supply metal-manufacturing, and he has the the opportunity of keeping in touch with the most up-to-date practices in this field of modern production.

Published at $4.50, "Tool Design" shows how to select or design:—proper materials, drills, reamers, milling cutters, boring bars, etc., tool holders, tool blocks for turret lathes, reaming and facing machines, design of all types of jigs and fixtures, die design—piercing, blanking, forming and swaging, etc.

I'LL GIVE YE

THREE DOLLARS

FOR EVERY $1.00 YOU NOW EARN!

Time . . . Labor! Those are two of the "bottle necks" of production that most manufacturers are faced with these days! In sanding . . . both of these bottlenecks can be broken with "Sandy", the Sterling Surfacer. Because (1) "Sandy" will do your sanding 3 TIMES FASTER, or (2) "Sandy" can do the same amount of sanding that THREE of your fastest handsanders can do! No wonder so many manufacturers have turned to "Sandy" to help them overcome these problems. A Sterling engineer will gladly help you on any sanding problems you may have.

Write for more information TODAY!

SEND FOR FREE "HINTS" ON SANDING SAVINGS TODAY!

FREE Send for "Hints on Sanding Savings" TODAY! Address Sterling Tool Products Co. 363 E. Ohio St. (D-5) Chicago, Illinois. Don't delay! Write at once! Only a limited supply of this valuable leaflet remains.

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363 E. Ohio St., Chicago, Ill.

SMALL WORK . . .
SECURELY
HELD WITH THIS
Drill Jig

Self contained and well built. Quick to change for length and diameter, for both shoulder work and gauging from the end. Chips fall away from gauging parts.

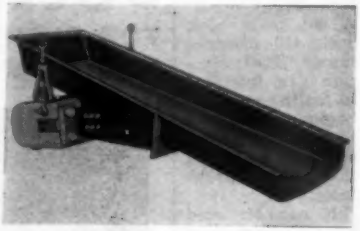
A. S. A. Standard bushings with liner to drill any size hole up to ¼" diameter. One bushing furnished with Jig. V block to center work. Can be made any form for holding special pieces. Locking handle can be reversed for either hand.

Let us send you more information.

RACINE SCREW WORKS
RACINE WISCONSIN

New, Heavy Vibratory Feeders

The Syntron Co., 300 Lexington Ave., Homer City, Pa., announces two new models of their electromagnetic Vibratory Feeder Conveyors.



The Model F-4 illustrated has a capacity of up to 100 tons per hour of material such as crushed rock, and carries feeder pans as large as 36" by 60". The larger capacity Model F-5 will handle as much as 500 tons per hour and can be supplied with troughs as wide as 48" and 60 to 96" long.

These new models, like the smaller-capacity Syntron feeders, are vibrated at high speed by a pulsating electromagnet. The exclusive priniciple of energizing these magnets through the medium of a rectifier tube is given credit for the heavy tonnage capacity.

One major feature is finger-tip rheostat control of the rate of flow. Another major feature is the entire absence of moving parts. Complete information is presented in a new catalog now available.

For Machine and Tool Work & Quick Set-Ups

The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading.

Price $5.00 plus postage *Write for folder.*

J. R. Reich Manufacturing Co.
45 E. Stroop Rd., Dayton, Ohio

Calibration

Requests from manufacturers for the calibration of high precision end gages, required for mass production of interchangeable parts for airplane engines and other vital military equipment, are reaching the National Bureau of Standards at an increasing rate —now more than 800 a month, according to the Department of Commerce.

The extent to which such gages are used in industry is shown by the fact that during the years since this work was undertaken the Bureau has calibrated more than 60,000 gages.

The tolerance of some machine work requires the precision gage of the shop to be correct within one or two hundred - thousandths of an inch. This, in turn, requires that the secondary or working standards used in the testing laboratory to be correct within millionths of an inch.

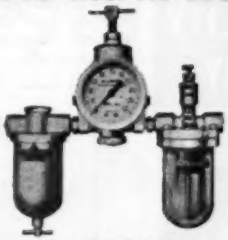
In earlier years the end standards of the Bureau were calibrated with the accepted international line standards derived from the meter. These methods, requiring the use of microscopes, were subject to a wider margin of error than permitted by the close tolerances required in modern mass production.

In more recent years the lengths of standard light waves, which are invariable, have been used as primary standards. This method is based upon the standard wavelength of the red line of cadmium. Within the length of the standard meter the scientists have found more than a million and one-half wavelengths of light.

A ruling machine developed by the Bureau for graduating meter bars in terms of light waves is now in regular use and progress has been made on similar equipment for stopping off decimeter and shorter scales.

Meter bars produced with this equipment differ from the approved international standard by less than two parts in 10,000,000.

USE AIR AT ITS BEST!



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. . . feed your air tools *clean* air, *controlled* air, and *oiled* air which lubricates every tool in your plant, automatically. The 60,000 lubricators in use have proved that Norgren Lubricators will cut your oil and repair costs 75%! *Filter* stops scale, impurities, and excess moisture. The *Regulator* delivers exactly the right pound-push for perfect performance—without fluctuation. And the Sight-Feed Lubricator completes the air preparation with a fog of oil. No waste. Prevents rust. Cuts repairs. Steps up production-per-tool.

There is a Norgren air cleaning, lubricating, and control assembly for every place air is used in industry.

CATALOG 400.

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COMBINE ACCURACY AND DEPENDABILITY WITH ECONOMY

BY USING

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DIAMOND WHEELS

CEMENTED carbide tools can be sharpened faster, more accurately and economically with SECOMET DIAMOND WHEELS, made of the finest quality bortz and resinoid bond—available in a wide range of standardized sizes and types making it possible to select a suitable wheel to meet any ordinary requirements—for extraordinary performance . . . Write for further information and our new price catalogue.

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Kennametal Issues New Catalog

Catalog No. 42, covering specifications and prices of standard Kennametal steel-cutting carbide tools and blanks, has just been issued by McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa.

The new catalog is said to be one of the most complete carbide tool manuals published to date. Typical aplications of each style of tool are illustrated by line drawings, photographs and information on specific examples of the use of Kennametal have been included. Several pages are devoted to selection and design of tools and blanks, correct grinding procedure, chip breaker designs, brazing tool blanks to shanks, boring tool set-ups, and other pertinent engineering data. The new Kennametal round shank boring tools, cut-off tools, roller type turning tools, and solid round tools are illustrated and described.

Welding Data Book

Vest pocket checking pad for cutting costs, speeding work, improving quality, increasing profits by arc welding—40 pages—pictorially and editorially questions reader about 23 typical arc welding applications for possible use and benefit by manufacturers. May be obtained free of charge from Hobart Brothers Co., Troy, Ohio.

New Book

A new "Machinists and Tool Makers Handy Book," by Frank D. Graham, is announced by Theo. Audel & Co., 49 W. 23rd St., New York. Published at $4.00, it contains 1600 pages and is fully illustrated.

This treatise is intended to cover modern machine shop practice in all its branches. It is divided into five parts: — shop practice, blue print reading and how to draw, shop mathematics, shop physics, and how to use the slide rule.

The section on modern machine shop practice begins with an outline of shop measuring tools. All types from the rule to micrometers are described. Their use for measuring and laying out are given in detail. The most commonly used materials are treated briefly. Heat treatment is discussed along with answers to some practical questions on annealing, hardening, and tempering.

Bench work, lathes, cutting tools, how to operate a lathe, cutting screw threads, and lathe attachments are the subjects of a few representative chapters in this first section. The author covers practically every shop subject of interest to the machinist, such as:— jigs and fixtures, turret lathes, dividing heads, spinning metals, tool making, automatic screw machines, etc. In all, over 1100 pages are devoted to the shop section.

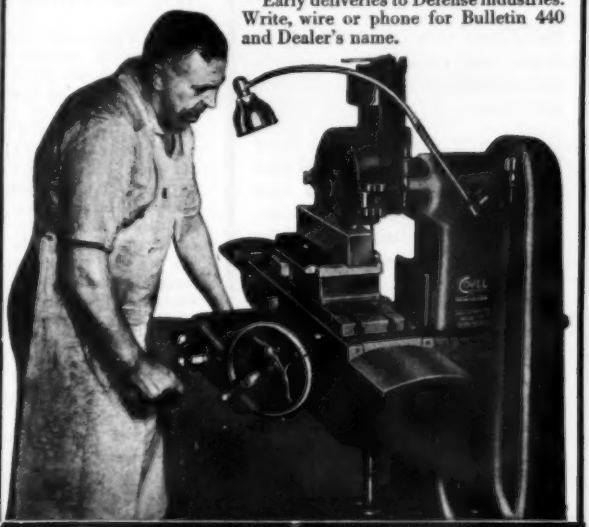
Free hand drawing, drawing instruments, and how to draw are discussed in the second section. Blue print reading and code symbols are also included.

PROFIT-THROUGH

★ PRECISION!

In these days of Defense rush orders, Precision pays profits. "Rejects" cost too much time and money. That's why the exact accuracy of a Covel No. 15 Hand Feed Surface Grinder saves valuable hours for vital production of "M" Day or everyday orders.

Early deliveries to Defense industries. Write, wire or phone for Bulletin 440 and Dealer's name.



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COVEL MFG. CO., BENTON HARBOR, MICH.

(Pronounced COLE'-MON-OY)

Remember when you could call up in the morning and have a new replacement part delivered in the afternoon?

Now it's quicker—cheaper — to hard-surface all wearing parts with COLMONOY. On machine tool parts such as lathe points, dogs, chip breakers, drill flutes, wire straightening shoes, thrust bearings, screw machine fingers, forming and drawing edges, centerless grinder rests COLMONOY No. 6 is proving invaluable. Equipment that must take a lot of punishment—perhaps for 24 hours a day—will operate efficiently, with less wear, when the proper grade of COLMONOY is used as a hard-facing for all parts subject to excessive abrasion and corrosion. It will pay *you* to investigate.

Write today for catalog—and special information covering specific applications.

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COLMONOY

Hard Surfacing Alloys and Overlay Metals

Universal Announces Floating Chuck

Universal Engineering Co., Frankenmuth, Mich., announces a new Floating Chuck designed especially to operate in a horizontal position in automatic screw machines and turret lathes.

It is explained that by means of adjustment, the weight of the various tools can be counter balanced and in this manner increased feed can be used with a chuck of this kind, without the danger of marring or causing bell mouthed conditions. The construction is such that the spring pressure is from four different directions and can be increased and decreased in any direction by means of the adjusting screw.

These chucks use a ball bearing drive both for the lateral movement and for thrust. Floating chucks will be found useful for drilling, counter boring, reaming, and for any tool where piloting from the lead hole is required. There is no dogtail motion, it is claimed, as this chuck operates in the same vertical plane at all times. Descriptive literature is available.

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Numbering Machines

Automatic and Hand Operated

for stamping in Metal, Fibre, Plastics, etc. Do faster and better work than Single Steel Stamps.

For Marking Metal Parts, Name Plates, Metal Checks, etc.

Write for Catalog.

NUMBERALL STAMP & TOOL CO., Inc.

Huguenot Park, - - - Staten Island, N. Y.

Magnets

New alloys for permanent magnets are about thirty times better than the best carbon steels used a decade or more ago, according to William E. Ruder, head of the metallurgical and magnetic section of the General Electric Research Laboratory.

Part of this advance, he explains, has been achieved by heating the magnet material and then slowly cooling it in the field of a powerful magnet.

Until about 1930, Mr. Ruder points out, permanent magnets for the countless applications in electrical equipment were made of alloy carbon steel. Then alloys free from carbon were devised. Some of the most effective are those known as "alnico."

The latest alnico, an alloy generally consisting of iron, aluminum, nickel and cobalt, he states, was first proposed by a laboratory in Holland and developed by the G-E research staff. This may contain a small amount of copper as well. With magnetic cooling, its maximum energy is about five times greater than that of the best alnico alloys of a few years ago.

The new alnico contains a higher percentage of cobalt than the old, making the cost per pound relatively high. However, Mr. Ruder declares, "the high energy content with the resultant saving in size brings the cost per unit of available energy to a figure quite comparable with the other alnico compositions.

"The application of this outstanding recent development in magnetic materials calls for radical changes if its use is to be justified," he states, "but in all applications where such changes are possible, considerable savings in material and reductions in size and weight of apparatus can usually be made."

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There is no quibbling about the diameter being right or wrong when you snap one of these Snap Gages on the work. You see the truth in the dial — in either .001" or .0001". It's adjustable to anything from 0" up to 1" capacity. It would take a lot of "fixed" or regular type Snap Gages to cover the same range. If you would like to know more about it; write—
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NeuTrol eliminates "hammer and pry". Just turn the power "Off" and you can pick up the work piece in a few seconds. NeuTrol eliminates waste time—saves the chuck—eliminates injury to the operator. NeuTrol can be easily installed on grinding machines now in operation—or on new grinders by grinding machine manufacturers.

Two types: Motor Controlled for Remote Control—and Manual Controlled for small units. "There's a NeuTrol for every size of chuck."

Write for Complete Information

ELECTRO-MATIC PRODUCTS CO.
Also Makers of Rectifiers
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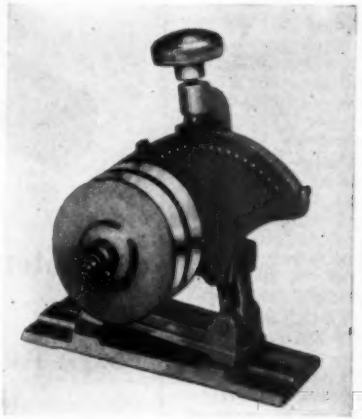
JFS-Cub Variable Speed Control

A new V belt variable speed transmission known as the JFS-Cub is announced by Standard Transmission Equipment Co., 416 W. 8th St., Los Angeles, Cal.



It is the newest addition to the line of speed controls manufactured by the company and is especially designed for all "A" section V belt applications and for speed ranges up to 3.3 to 1. Smooth sided pulleys are used, rather than the interlocking type. Among the advantages claimed are:—a patented positive belt alignment feature which permits mounting the Cub in any position without impairing function or throwing belts out of alignment; machined and balanced cast iron construction; forced lubrication of the special bronze bearings on which the pulleys rotate; free-end pulley spindle to permit easy installation of belts; both pulleys on one side of pivotal mechanism which permits motor pulley and driven pulley to be almost directly in line.

The JFS-Cub is offered as a low cost speed control for application on machines that have not previously adopted infinite speed selection because of expense. Maker declares that the Cub will transmit full capacity of "A" section V belts.

Precision

An interesting use of air conditioning is in the making of precision gage blocks. Pratt & Whitney, makers of Hoke gage blocks, built a new plant in 1939, in which was provided a constant temperature area 240 x 40 ft.

A remarkable air conditioning system makes these rooms among the most accurately controlled working spaces of this kind in existence. Two large rooms take up most of this space. One of these is used principally for manufacturing, while the other is the inspection room where the final measurements are carried out accurate to a few millionths of an inch.

The conditions set up for the constant - temperature room were 68° F. dry bulb and 50% relative humidity, to be maintained the year around. These are the conditions which are used by the U. S. Bureau of Standards and are accepted as those to which all most accurate measurements should be referred.

The importance of exact control of the temperature is easily recognized on account of the precision apparatus in use. The constant relative humidity of 50% is necessary due to the use of the interferometer, which is dependent upon the velocity of light waves for its use, which velocity in turn is affected by a change in the relative humidity in the air.

Many of the charts show a variation in temperature over the 24-hour period of not over one-fourth of one degree, plus or minus.

The entire control of the conditioner is automatic. It takes care of the various changes over the whole year and at a minimum of refrigeration.

GET "NonStop" PRODUCTION
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Write for Bulletin 141, which contains complete information on Jessop NEW PROCESS Cold Header Die Steel.

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Visual Training

The Film Productions Co., 1504 Hennepin Ave., Minneapolis, Minn., announce completion of a series of sound motion pictures to be used by industrial firms in training mechanics faster to take over the speed-up jobs of defense production.

The eight pictures already completed include: — Metal Cutting Principles; Precision Layout and Measuring; Jigs and Fixtures; Dies and Die Making; Lathe Operation; Planer and Shaper Operation; Milling Machine Operation.

These films are designed to make basic fundamentals of machine shop practice easy to understand. To accomplish this, makers of the film show machines and their operations by animated drawings, micro-photographs and direct photography. The result is a close-up view of operation methods that is easy for the student to absorb and put into effective practice in actual work.

Each subject in the series of films is treated in a way that permits use of the films separately.

Industrial plants and trades-training schools are finding use for this new method of training. It increases the speed at which new men may be trained to take over their jobs, and up-grades men already skilled in some phase of machine shop practice.

The general function of the film series released is to enable managers of American production plants to add helpful and supplementary training to speed up defense efficiency.

Have you our Engineering Data Sheets on the new line of

BABY GUSHER
Machine Tool Coolant Pumps?

Made in four types; 1/30 and 1/10 h. p. for small machine tools and machines requiring from 4 to 10 G. P. M.

Write for descriptive literature.

The Ruthman Machinery Co.
1819 Reading Rd., Cincinnati, Ohio

Phosphorus

The concentration of phosphorus on the surfaces of the little air pockets or blow-holes in iron or steel has recently been proved by using radioactive tracers, according to Westinghouse research physicist W. M. Shoupp. Keen interest in this subject comes from the fact that too much phosphorus makes steel brittle, and the more that can be found out about the way these two substances combine, the greater the opportunity to improve steel-making.

A simple "camera," consisting of a tin can, two small brass discs, and a screw clamp, was improvised for this experiment by Dr. Shoupp at his laboratory. This device records on photographic film the rays from artificially radioactive tracers of phosphorus, revealing their location in the steel.

A sample batch of steel was melted into which was put radioactive atoms, or tracers, of phosphorus. The phosphorus had been made artificially radioactive by bombardment in an atom-smasher so that it would send out invisible rays like those emitted by radium. These rays do not affect the action of the phosphorus, but they reveal the location of the atoms from which they are sent out. The light areas on the developed print corresponded with the blow-holes in the steel disc, indicating the phosphorus had concentrated on the surfaces of these holes.

This simple method of taking pictures of radioactive tracers can be used to reveal the location of other substances such as sulphur, carbon, manganese, or silicon in steel. Any of these substances can be made into tracers with an atom-smasher.

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Mechanics Through the Ages

THE DEVELOPMENT OF THE FLINT-LOCK GUN IN HOLLAND DURING THE EARLY 1600'S, IT IS SAID, WAS INSPIRED BY THE DEMAND AMONG A GANG OF CHICKEN THIEVES FOR A SUBSTITUTE FOR THE THEN-USED MATCHLOCK WEAPON, WHICH, SHOWING ITS FIRE AT NIGHT, SERIOUSLY HAMPERED THE NOCTURNAL PROWLINGS OF THE POULTRY SNATCHERS.

Although JAMES NASMYTH OF ENGLAND, AS EARLY AS 1839, SKETCHED PLANS FOR A SUCCESSFUL STEAM HAMMER, HE MADE NO MOVE TO BUILD THE TOOL OR EVEN PATENT IT UNTIL, BY CHANCE HE STEPPED INTO A PLANT AT CREUZOT, FRANCE, THREE YEARS LATER, AND SAW, IN OPERATION, A STEAM HAMMER THAT HAD BEEN SECRETLY COPIED FROM HIS ORIGINAL PLANS!

RURAL CHAIR MAKERS OF ENGLAND STILL USE THE ANCIENT TYPE OF POLE LATHE TO FASHION THEIR WARES.

STANDARD *Cemented-Carbide* TOOLS

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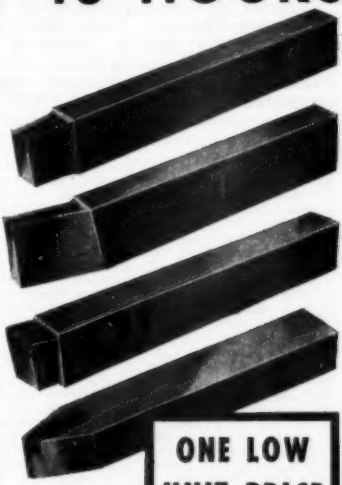
For several years, the Morse Tool Company has been producing thousands of these tools for a limited number of customers. Now the departments devoted to cemented-carbide work are installed in a separate plant . . . with the most modern equipment . . . and with a large crew of thoroughly experienced men. The expanded production facilities have made it possible to build up the complete range of types and sizes which can now be supplied from stock.

The present prompt deliveries cannot be guaranteed indefinitely. To avoid disappointment, we suggest immediate action on your part. Write for complete information and prices.

We are authorized suppliers of Carboloy, Firthite and Vascoloy-Ramet cemented carbides.



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Carbide Fabricators DIVISION OF

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These Plants Are Available

SUPPLEMENTING the lists recently published in these columns, here are additional plants equipped for subcontract work. Other plants are available, with sizeable screw machine and gear cutting facilities. If you need such equipment, please let us know dimensions and volume required and we will supply full information.

Address all communications to Defense Sub-Contract Dept., Hitchcock Publishing Co., 508 S. Dearborn St., Chicago, Ill. No obligations are entailed. This is a gratuitious service originated by THE BLUE BOOK for the sole purpose of helping defense efforts in the current emergency.

H-8—Efficient Midwestern plant equipped for making dies, jigs, fixtures, stampings or handling production work. Equipment includes 5 lathes (1 turret), 3 milling machines, 3 punch presses, shaper, surface grinder, planer, 3 filing machines, band saw, tool post grinders, drill presses, etc. Good mechanics.

H-9—Tool Company engaged exclusively in the manufacture of carbide-tipped tools. Prompt deliveries on special and standard tools. Tolerances to .0001".

H-10—Group of Midwestern plants that have pooled their production facilities for sub-contract work. Excellent equipment and technical skill is included for machine and tool design, machine tools, deep drawing, welding, press brakes, heavy stamping, light stamping, etc. This group is accustomed to working with aluminum, steels including stainless, copper, brass, tin plate, etc. Ten buildings are included, 3 with railroad sidings and others are close to railroads. Total floor space is 230,000 square feet and there are 450 skilled and unskilled employees. Equipment includes 2 automatic screw machines, 5 hand screw machines, 14 engine lathes, 7 milling planers, 3 planers, 7 shapers, 15 grinding, filing and sanding machines, 28 drill presses, 4 deep drawing presses, 21 welding and 2 cutting torches, 5 press brakes, 35 presses for heavy stampings, 39 presses for light stamping, and unusually complete equipment for plating, buffing, polishing, painting, finishing, sheet metal working, metal spinning, etc.

Firm: H4 Midwest plant with 60,000 sq. ft. of floor space, is at present working day shift only. Could add two night shifts. Has unusually wide range of equipment including:—2 head planer, 18' table, 32" between housings, 30' bed; 10' power press brake, 8 gauge; turret lathe; 16 bench type drill presses, all sizes; 6 engine lathes; 10' 8-ga. power shear; 5 disc grinders, double end; 5 milling machines; shaper; radial drill; 5 metal cutting saw tables; 11 floor type drill presses, all sizes; 4 buffing and polishing lathes; 5 endless belt sanders; 4 swing polishing lathes; 4 pipe bending machines; 250 and 450 amp. arc welders; Heavy duty abrasive cut-off machine; tilting band saw; 2 complete acetylene welding outfits; large spray booth; Also the following woodworking machinery:—2 blade, 16" joiner; 2 blade 24" planer; 15" tilt table rip saw; 36" band saw; 16" disc sander; 24" throat jig saw; 14" swing, 24" bed and 26" swing and 80" bed woodworking lathes. Also complete nonferrous metal foundry and equipment with 4 gas and oil burning melting furnaces; sand blast outfit; cranes; core ovens, sand sifting riddles, band saw, etc. Can do machining and finishing work to specifications, furnishing pattern work, castings, sheet metal work, stampings, assembling, etc.

Firm: H3 Midwest firm offers experience of more than 30 years in metal stamping and die field. Has four experienced tool and die makers available for producing tools and dies for work to be run through production department. Equipment includes:—32 presses up to 65 tons, 4" stroke, 4 press brakes, 18 gauge 72"; 4 spot welders; 3 horizontal shapers; 3 lathes; 2 filing machines; 1 tool grinder; power hack saw; plain milling machine; 4 squaring shears; 2 high speed hammers; d.c. arc welder; acetylene welding outfit; 6" vertical shaper; 4 drill presses; Doall contour saw; Abrasive cut-off machine; small electric furnace, etc.

Firm: H2 Manufacturer of small automotive parts—open shop—75 employees, female operators and assemblers. Want punch press work for 50 ton presses and smaller automatic screw machine work for No. 2 B&S and smaller; have milling, riveting, eyeleting and welding equipment for complete assemblies in brass, steel and Bakelite and job spot welding in 14-gage and lighter. Occupies only half of present building and could build higher or use more ground area as needed.

Firm: P Already very busy but needs even more volume to fill big new addition to present bldg. Doing lots aircraft work. Have 15 milling machines, boring mills, drill presses, grinder, jig borers, bench lathes (5) and 5 engine lathes, 5 surface grinders, 6 shapers. Vast variety of small tools; also complete heat treating equipment and 2 sets Johansson blocks and Carl Zeis instruments.

F-A—Midwest plant with about 30,000 sq. ft. floor space. Now on one shift only. Excellent reputation for careful, quality work. Medium type work. Can fabricate and assemble. Open shop. Want all kinds of

Now for Sub-Contract Work

lathe work, hand screw machine, etc. 1 No. 2 W&S hand screw machine and 1 No. 1 W&S. A large assortment of engine lathes; also milling machines, shapers, drill presses, sheet metal brakes, 14 grinders, plating, cleaning tanks, paint and enameling facilities. One large primary contractor feels this firm is the most satisfactory on his list.

F-B — Nationally known manufacturer of precision equipment. Capable of very close tolerances. Open shop. Lots of Screw Machines, Jewelers Lathes, all kinds metal working equipment of a light variety including extensive welding facilities. Fine assembly equipment. Complete designing and engineering departments. Now on one shift and overtime. Have completed high precision aircraft work recently.

F-C—A large heavy equipment manufacturer known widely in street railway and railroad fields. Open shop. During depression branched out into a wide variety of products and hence have versatile facilities. Huge punch presses, brake presses, drill presses, finishing, welding and other similar complete equipment. This firm is capable of doing a complete assembly job in its field.

F-D—Long established middlewest heavy jobbing machine shop. Full staff. Open shop. Five vertical boring mills, 2 horizontal boring mills, planers, milling machines, turret lathes, tool department, pattern shop, etc. One of best all-around shops now open for more high priority work. Enjoys fine reputation for good work. Capable management . . . young, energetic. Doing some Navy work requiring high precision.

F-E—Old established plant in Chicago area doing light specialty metal work. Have their own line of hardware specialties. Ample equipment for almost any light requirements. Engine lathes, punch presses, gear hobbers, hand screw machines and turret lathes, grinders, drill presses and milling machines comprise major equipment. Also finishing department. Makers of lawn sprinklers, traps, etc. Well recommended set-up.

F-F—Well known midwestern manufacturer in heavy machine work. Fine engineering staff and capable of a complete manufacturing and assembling operation. 2 Bullard vertical boring mills, 2 horizontal boring mills, various boring machines, vertical drill presses, radial drills, 16 large engine lathes, some milling machines, planers, shapers, heavy cranes, etc. A list of equipment of this firm is mandatory to fully appreciate its possibilities. All heavy work.

F-G—A medium and heavy milling machinery manufacturer. Old in its field. Midwest. Large lathes, grinders, drill presses, millers, planers, boring mills, etc. Facilities for making own jigs and fixtures. This firm is open for suitable work and would be a valuable addition to any sizeable sub-contract defense requirements.

F-H—A nationally known manufacturer of machinery for flour and feed milling trade. Ten large engine lathes, 6 production turret lathes, pulley turning machines, boring mills, drill presses, planers, shapers, grinders and complete welding department. Has one Flather automatic gear cutter and one Gould & Eberhardt automatic gear cutter. Also threading machines. A fine set-up for any primary defense contractor seeking ample midwestern facilities.

F-J—An outstanding gear jobbing plant. Highgrade, precision work. Lots of new equipment including 9 Gleason machines, 8 gear cutters, keyseaters, broaches, 9 hobbers, 7 gear shapers, 2 gear testers, 5 thread mills, ample millers, shapers, engine lathes, turret lathes, hand screw machines, drill presses, boring mills, thread grinders, grinders, etc. One of best outfits in entire middlewest and worthy of closest study. Good management, too. New plant.

F-K—Fine old company, known for years as a leader in recording machinery and devices. Was one of principal suppliers of these units to scale companies. Good staff. Full equipment for high grade, precision work. Five millers, six engine lathes, five turret lathes; also planers, bench lathes, shapers, presses, cut-off machines, sheet metal machinery, grinders, welding, riveting, plating, finishing facilities. Well worth consideration by substantial organizations seeking capable channel for subcontracting. Doing some defense work now. Open shop.

F-L—A gear job plant headed by a gear expert known nationally for his gear developments in automotive field. Very accurate work. Desirous of getting ample helical and spur gear work as well as worm gears. Thoroughly qualified to handle difficult precision jobs. A full complement of gear cutting and gear hobbing machines and equipment for secondary operations. No bevel work. Ample heat treating facilities. Open shop. Declared by some nationally known firms to be an eminently satisfactory gear shop.

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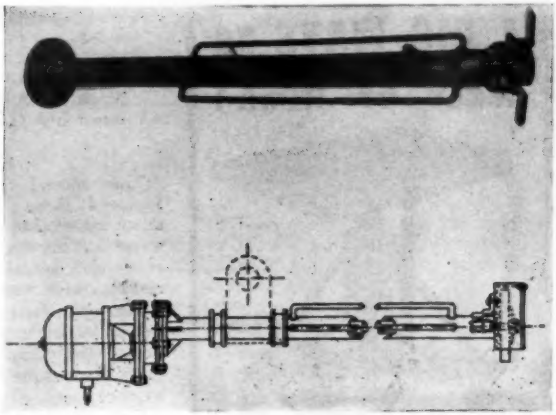
333 N. Michigan Ave., Chicago, Ill.

Arc Welding in Fabrication of Special Swing Frame Grinder

By JOHN S. GREEN

A SPECIAL type of Swing Frame Grinder was needed to grind Unfired Pressure Vessels built in accordance with API-ASME Code. The shells for these vessels consist of rolled steel plate, flanges, and nozzles fabricated by the arc welding process. Code requires longitudinal and circumferential seams to be welded from both sides of plate. Shop practice is to run outside beads as first operation; then this bead is chipped from inside to remove slag; followed by application of inner bead as the final welding operation. This inner bead must conform to contour of shell, in order to provide clearance for Tube Bundle which is to be inserted.

As shells were to be ground on internal circumference, the conventional type of Swing Frame Grinder could not be used. A grinder for this requirement had to be constructed with grinding wheel revolving in same direction as drive shaft. No suitable



Here is the welded tubular grinder frame as well as details of the complete assembly.

machine could be located on the market.

Prices submitted for building a suitable type of drive ran from $700.00 to $1000.00 with eight weeks' delivery. It was decided to design and build the required machine in our shop, of welded construction and an appropriation of $600.00 was approved to cover cost.

A 2"x12" Emery Wheel at 2000 r.p.m., was selected as correct size to cover the range of shell diameters. A 3 h.p.—1430 r.p.m. — 25 cycle 3 phase — 220 volt motor was selected as the driving medium. The overall length was set at 8 ft. with a 40" reach into the shell when supported by special built jib crane.

As the main member of the Grinder Frame, a seamless drawn tube 3-¾" OD x 2-⅞" ID was taken from stock. With exception of motor, bolts, gaskets and ball bearings, all other material was taken from the steel racks. As this grinder had to be operated from rear of wheel, three horizontal handles of cold rolled ¾"x36" were welded to the tube. Pencil sketch shows the general assembly.

Due to limitations of 25 cycle motor speeds, it was necessary to use gears to obtain correct speed of wheel. This was accomplished by application of herringbone gears set in gear case as shown. The offset motor support drops the center of gravity of frame to a point where friction generated by wheel in grinding will not cause it to revolve in the bearing support, yet same is easily oscillated as operator follows circumference of shell. This offset weight brings machine back to normal position when operator releases pressure on handles.

The support consists of a split cast iron collar, with frame oscillating in ball bearings. Set collars are applied so that operator may adjust center of balance to suit grinding requirements.

Frame housing is bored for radial and thrust bearings to support drive shaft.

Wheel guard is fabricated from section of 14" pipe and two ½" steel plates. Grinder is suspended by chain hoist from jib crane. When not in use, a suitable hook engages with eye bolt on wheel guard to keep wheel from resting on floor.

Cost of building the Swing Frame Grinder as illustrated figured:

Material:

Steel Bearings and Gears	$56.17
3 h.p. Motor and Controls	$176.00
Direct Labor:	
Welding 18.3 Hours @ .90	$16.47
Machine 98.4 Hours @ .75	$73.80
Assembly 32.6 Hours @ .70	$22.82
SHOP COST	$345.26

This special Swing Frame Grinder replaced three small Grinders. The advantages obtained by welded construction allowed for reducing clearances to a minimum and gave required rigidity with less weight on this particular job than could have been obtained by any other method of fabrication. The lightness of the machine gave the required flexibility and speed in operation.

Cost sheets show a 27% reduction in overall grinding costs on Heat Exchanger Shells, by use of this special Swing Frame Grinder, which replaced three conventional type Grinders.

(Illustrations — Courtesy Hobart Brothers Co., Troy, Ohio.)

4 BIG WAYS TO SPEED UP WORK!

Use this

LYON *Portable*

Hydraulic Elevating Table--

1—Moving dies in and out of presses or racks.

2—Lifting into place or supporting overhanging work on various machines.

3—Transferring heavy parts from one machine or workbench to another.

4—Bringing work to convenient height for operator.

On these four and dozens of similar jobs around the shop, this Lyon Hydraulic Elevating Table will help you *speed up work* and *cut down accidents*. It's completely dependable — because it's completely HYDRAULIC. Raising and lowering under full control of easily operated foot pedals.

The base is the same size as the table. Cut-outs give foot room. Diagonal truss tubes distribute load evenly. This portable elevating table will quickly repay its moderate cost. Write *today* for prices, early delivery dates and complete information.

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297 E. 16th St., Conneaut, Ohio

Experiences with Rocker Beam Designs

By JOSEPH KUCHAR*

WE ARE manufacturers of heavy-duty tractor wagons and trailers mounted on track laying wheels and used in the logging, oil field industries, sugar cane hauling, earth moving and for transportation of miscellaneous heavy loads over rough terrain and all weather conditions.

We purchased our first arc welding machine for miscellaneous maintenance arc welding. Our experience with this arc welder indicated to us extreme possibilities, not only as a repair necessity but as a tool for production items as well.

Our experience and the good results obtained by arc welding led us to explore the full possibilities of welded structures, by purchasing two additional arc welders. With the addition of these two machines we were able to branch out with other welded designs of superior quality and dependability.

Rocker Beams

For many years we have used cast steel rocker beams, (see "A" of Fig. 1), which are used in connection with track-laying wheels and equipment of our manufacture. Due to hidden defects, failures were encountered from time to time. Failures of this nature are very costly to the customer and the manufacturer.

In order to provide some margin of emergency strength as required in the heavy duty equipment that we manu-

*Chief Engineer, Athey Truss Wheel Co., Chicago.

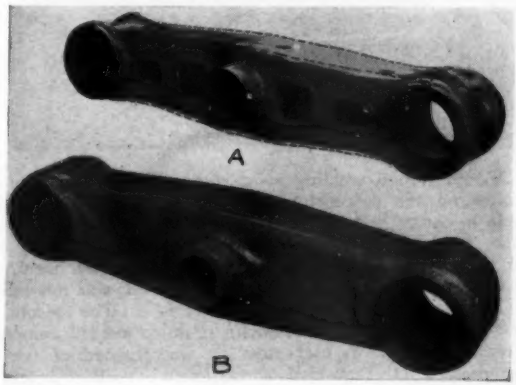


Fig. 1 — "B" — rocker beam built to First Welded Design. "A"—dotted lines indicate location of reinforcing plates.

facture, we undertook to weld reinforcement plates top and bottom as indicated by dotted lines on "A" of Fig. 1. This proved to be a rather costly procedure, but it did eliminate casting breakages encountered, thus reducing service costs and compensating for increased cost of welding reinforcement plates.

The cost of casting for replacement was not the big cost but the delays due to casting failures are very costly to the contractor, because it means a tie-up of the tractor as well as the trailer. A tie-up of this sort runs into a considerable amount of money in a very short period of time.

rocker beam was possible, but to eliminate hidden defects was something that was uncontrollable by us. Therefore, the pressed steel welded construction resulted which is illustrated by "B" of Fig. 1.

The first designed pressed steel welded construction rocker beam consisted of the following material: — 2 rocker beam halves (pressed steel) 5/16" thick; 1 rocker beam main bearing (cast steel); 2 rocker beam end bearings (cast steel); 2 grease pipes; 2 pipe couplings; 4 back-up strips ⅛"x ¾" (band steel).

We encountered some difficulty on the first designed rocker beam. To

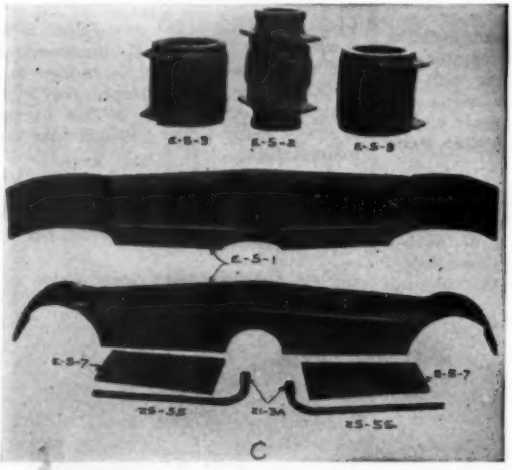


Fig. 2 — Parts of First Design of Arc Welded Rocker Beam.

We continued welding reinforcement plates on the castings until we were able to design and build a rocker beam that would provide an ample margin of emergency strength to resist shock load impact.

To obtain this, we investigated various designs from the standpoint of increased section, in cast steel as well as pressed steel welded construction. The increased section of the cast steel

overcome the defect, we eliminated the use of back-up strips and substituted reinforcement plates as illustrated in Fig. 2. The outside appearance of the rocker beam as illustrated at "B", Fig. 1, was not affected by this change.

The second designed pressed steel welded construction rocker beam consisted of the following material: — 2 rocker beam halves (pressed steel) 5/16" thick; 1 rocker beam main bear-

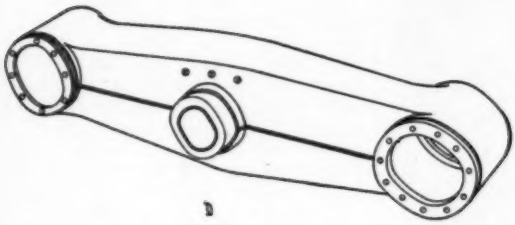


FIG 3

Fig. 3—Second Design of Arc Welded Rocker Beam.

ing (cast steel); 2 rocker beam end bearings (cast steel); 2 grease pipes; 2 couplings; 2 reinforcement plates (mild steel).

The rocker beams are completely welded in a fixture. The fixture consists of trunnioned structural welded box, base, two end bearing equalizer plugs, one center equalizer plug and a set of gears for manipulating the fixture by the operator to suit the proper welding angle.

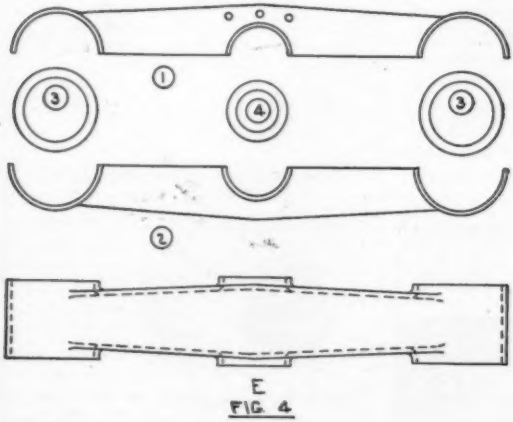
I have designed a rocker beam which will reduce manufacturing costs from 21% to 24½% of the present welded construction and 8½% to 15% of the original casting cost.

Second Welded Design

The second welded design overcomes the objection of increased book cost, also reduces manufacturing cost, weight and improves the appearance.

This design is quite different. The use of castings is eliminated, which in turn will reduce inventory and delays in production, due to the fact that castings must be ordered in advance of their need.

By dispensing with the use of castings, it is my opinion that further reduction in machining cost will be effected. However, I have assumed the same machining cost as of the present welded construction design.



E

FIG 4

Fig. 4—Parts of Rocker Beam in Second Design for welding.

The reason for further reduction possible is because the castings generally have sand on the surface, blow holes and other unneoessary defects that have quite a bearing on machining costs. The material used in place of castings is seamless steel tubing of known and controllable metal composition, thus permitting machining at higher speeds and feeds. The tool maintenance will be considerably less and tool life will be prolonged.

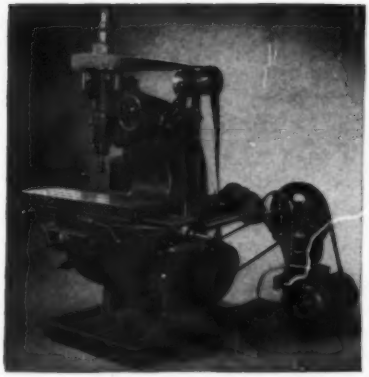
The proposed design as illustrated in Fig. 3 and the parts as sketched in Fig. 4 consists of the following material:—2 rocker beam halves (pressed steel); 1 rocker beam main bearing (steel tubing); 2 grease retainers (stamping); 4 rocker beam end bearing collars (steel tubing); 2 bent pipes with couplings; 1 center connection (pipe); 2 reinforcement plates (mild steel); 4 grease compartment plates (mild steel).

Tabulating the data shows an estimated weight of 150 lbs., a reduction of 30 lbs., or 16½% over the first welded design.

Cost of the first welded design was $34.30 and of the second welded design, $25.36—a saving of $8.44 or 24½%.

Cost of the cast design was $28.26. Subtracting the cost of the second welded design ($25.36) showed a saving of $2.40 or 8½% in addition to the numerous advantages of welded construction.

(Illustrations—Courtesy Lincoln Electric Co., Cleveland, Ohio.)



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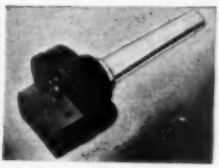

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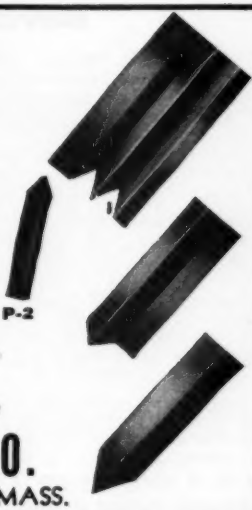

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Saving Alloy Scrap

R. C. ALLEN, Deputy Chief of the Iron & Steel Branch of the O.P.M., in Charge of Raw Materials, has sent out questionnaires to fabricators and manufacturers estimated to be using approximately 96% of the current production of alloy steels, including stainless steels.

A letter accompanying the questionnaire points out that the indicated demand for such alloying elements as nickel, chromium, molybdenum, etc., exceeds the current supply and that, while facilities for the production of these alloying elements are being expanded, all possible sources of supply must be explored and developed.

In many manufacturing plants from 20% to 40% of the alloy steel or alloy iron delivered is lost as scrap during conversion, and in some products the amount of scrap may run 70% to 80%.

The alloy content of such scrap is to a large extent reclaimable, but at the present time a large part of this alloy content is being permanently lost because it is mixed with other metal scrap. This is particularly true in the case of machine turnings or chips, flashings from forgings, etc. Alloy losses in the case of bar ends, punchings, rejects and similar heavy melting scrap, while smaller, are still relatively high.

The vast amount of alloy scrap produced daily by the industrial plants of this country should, if properly segregated, identified and returned in usable form, free from contamination, to alloy steel producers, yield a large tonnage of these vital alloying elements. It is to salvage this urgently needed supply that the OPM has launched this conservation drive.

In addition to making a valuable contribution to the defense program, it is felt that most plants will find the premium price obtainable for alloy content to result in definite operating economies, and the quantity of alloying elements available for further production will also be increased.

Many large manufacturers who, because of the nature and volume of materials handled have been operating highly organized salvage departments, have found these operations definitely profitable. Small manufacturers should experience little difficulty segregating and identifying heavy grades of alloy scrap such as rejects, punchings, and bar ends, although some problems may arise in working out economical ways of segregating and storing light scrap such as borings, turnings, and chips. However, the small plants usually keep non-ferrous metals such as brass and aluminum separate from iron and steel, and it should be possible to educate the machine tool operators to carry this step further and segregate alloy steel scrap from that of simple carbon steels; and knowing the compositions of the parts they are working on, further segregate the alloy steel scrap by types and grades.

(Courtesy of "Nickel Steel Topics" published by The International Nickel Co., Inc.)

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Steel

The Supply Priorities and Allocations Board announced recently that it had requested OPM to develop an allocation system for steel.

Substantial steps in that direction have already been taken in the handling of orders for steel plate; also for some time in regard to pig iron.

Extension of this policy throughout the industry means that distribution of steel through priorities ratings will gradually be replaced by direct allocations, with emphasis being placed first on those types of steel most in demand for defense purposes.

It was emphasized that because of the size and complexity of the task it would take some time and a considerable staff to work out the respective allocations of the numerous varieties of steel products, and details regarding the precise manner in which the plan will be put into effect are still to be worked out.

SPAB's action was taken after Army and Navy officials had pointed out that increasing problems in connection with deliveries of strucural steel, nickel steel, high-speed steel, tool steel and steel plate for defense use could no longer be solved properly through the priorities system alone.

Primary purpose of the step, of course is to assure distribution of the available supply where it will do the most good. Operation of the existing priorities system does not provide an adequate check against hoarding and the accumulation of excessive inventories. Furthermore, under priorities there is no simple way by which the armed services and civilian consumers may be assured that the Nation's overall steel production will be properly proportioned into the types of steel which are in greatest demand.

One of a battery of C-F Welding Positioners on the production line at the Manitowoc Ship Building Co., Manitowoc, Wisc.

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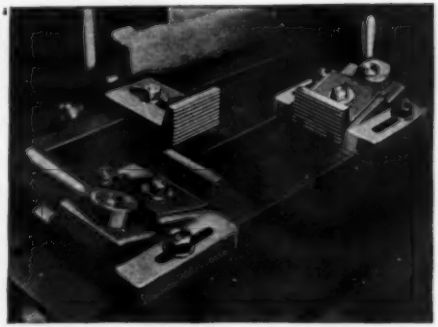

These jaws are designed for clamping parts securely to face of table. The set consists of two stationary and two movable jaws. Where unusually large work is to be clamped, several sets may be employed simultaneously if necessary.

The clamping jaw moves downward at an angle of 20°, giving assurance that work will be held securely against table or fixture when tightened by the eccentric cam lever. The clamp jaws are fitted with compression springs for automatically bringing clamp jaws back into a neutral position when eccentric clamp lever is released. The stationary jaws are of cast steel and are hardened. Adjustable clamp base is of semi-steel into which the movable cast steel hardened jaws are accurately fitted. Clamp lever is also of cast steel and hardened.

Eccentric cam action movement is approximately ¼". All four parts of the set, i.e., both stationary and movable jaws, are made with elongated slots for quick set-ups and are provided with approximately 2" adjustment. Each jaw is furnished with two bolts for holding jaw securely to table. Face of each jaw is 2" high with a 3" width and is serrated.

These Jaws are being used for quick set-ups by machine tool manufacturers, aircraft industries, metal and wood pattern makers and specialty manufacturers.

Size of base is 6⅜" wide x 5" long x 1" thick; size of slots, 17/32" wide x 2¾" long; and size of bolt, ½" diameter, 1" square head, ⅜" thick. Weight of movable jaw is approximately 18 lbs., and weight of stationary jaw, 10 lbs.

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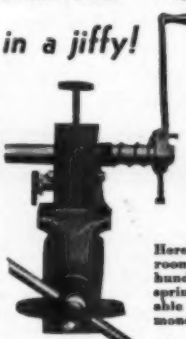

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Flow of Solids

Solid metals, used in turbines and other vital defense machinery, actually flow when heated and stressed. Finding the rate at which this flow, or "creep," takes place, can be speeded with new methods, Dr. Saul Dushman of General Electric Research Laboratory declared recently.

Some metals, like lead, creep at room temperature when subjected to stress, but even much harder metals show such creep when temperature and stress are sufficiently high. In general, the higher the melting point of a metal, the greater is its resistance to creep.

Usual methods of testing creep use bars of metal, which are placed in furnaces at temperatures from 800 to 1400°F. Such tests require from a month to a year.

In Dr. Dushman's accelerated creep tests, a thinkwire of the metal is used and heated to glowing temperatures, from 1500 to 2000°F., by an electric current. The wire is enclosed in a glass cylinder, through which nitrogen is flowing. This prevents the rapid rusting that would occur in open air.

A hanging weight exerts the desired pull. By watching the lower end of the wire through a microscope, the stretching due to creep is measured. In a day or two data are accumulated which would require months by the old method. Alloys of iron with chromium, nickel and molybdenum are found to be more highly creep-resistant than a number of other alloys.

Dr. Dushman stated that while this work has important practical applications, he is particularly interested in studying the atomic mechanism of the creep, and in correlating it with other properties, such as tensile strength. The experimental results suggest a theory that creep occurs by the movement of groups of atoms numbering from 50 to 1000.

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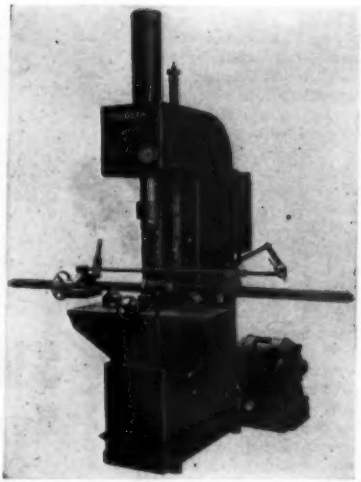
New Oilgear Presses and Controls

The Oilgear Co., 1310A West Bruce St., Milwaukee, Wis., offers several new styles of Gooseneck Presses in capacities from 6 to 25 tons for forcing, stamping, broaching, assembling, straightening and general manufacturing.



For maximum utility on varied production requirements, these presses are made with plain platens or lower platens can be arranged to receive detachable tables or fixtures as shown. Other features include deep working throats, large daylights and openings on three sides so they can easily be built into production line for handling small, large or long parts. Each press consists of a rigid, allsteel welded frame with integral pump and motor reservoir base; a ring type piston closely fitted to a honed steel cylinder; a large ground and polished ram guided in a long bronze liner; built-in direct reading pressure gauge; molded ram packing; enclosed control mechanism; built-in coolant reservoir; mounting for vertical motor driven coolant pump; direct pump and motor drive and a small or large "DH" two-way variable displacement Pump.

Two styles of standard sensitive controls are available. One, a servo-motor lever and pedal mechanism provides sensitive, almost "human" control of variable ram speed in either direction, the pressure applied to work, and distance of ram travel. Top and bottom limits of ram travel can be preset for repetitive cycles. Another, as servo-motor follow-up hand lever mechanism provides high speed approach for a preset ram travel (preferably to work); sensitive follow-up at speed and distance selected by hand lever movement and high speed ram return to a preset top position when lever is released.

Three styles of special controls, to meet specific production requirements, are also available. One, a semi-automatic hand lever and pedal control causes ram to move downward at a preset speed to a preset point and then

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return automatically at high speed to starting position. Another, a semi-automatic control provides automatic ram reversal when preset working pressure and tonnage are reached. Another control to a "DHP" Pump permits a preset pressure, up to maximum, to be maintained on ram indefinitely without excessive heating or power loss. Ram speed is variable in either direction and holding pressure is steplessly variable within range of control.

Two sizes of "DH" two-way variable displacement Pumps are available for each size press. One provides economical variable ram speeds for general manufacturing purposes and the other, higher variable ram speeds for greater production requirements.

Rifle barrels of varying lengths and diameters are straightened on the 15 Ton "PGRF" press as illustrated. The spring balanced bar carries the two overhanging brackets which support barrel slightly above resistance blocks. Both brackets are needle bearing roller equipped and connected through a rod for convenient movement of barrel to right or left. Rifle barrel is deflected against two resistance blocks and amount of deflection limited by a hand operated wedge type stop. Hand wheel on left-hand bracket rotates barrel as gauges on table determine its straightness.

Acro Die Cradle Bulletin

Descriptive literature on the new, universal parallel unit, known as the Acro Die Cradle, is available. The unit is intended for the level support of various size dies, jigs and metal parts, to insure correct alignment while drilling, counterboring, tapping, milling or grinding in the die making room or during machine shop operations. The circular stresses the elimination of makeshift methods for supporting such work, savings effected through prevention of spoiled work and the promotion of the safety factor. A copy of this new literature may be obtained by writing to the Acro Tool and Die Works, 2830 Montrose Ave., Chicago, Ill.

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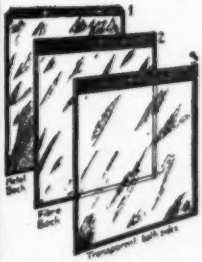

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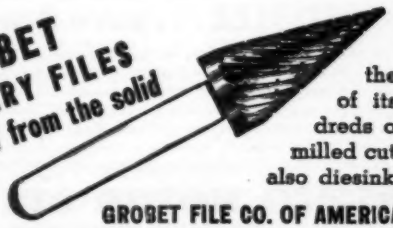

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Colonial "Junior" Presses

Colonial Broach Co., 147 Jos. Campau, Detroit, announces a number of changes in design of their "Junior" presses to increase work handling capacity, condensing the line to two models. Designed for assembly, straightening, etc., the line now includes hydraulically operated units rated at ½ and 1 ton capacities, both with 12" stroke and designated as Models VJ1-1000-12 and VJ1-1-12 respectively.

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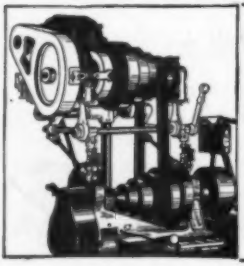
The two models are similar in design and construction with principal dimensions identical. Both are suitable for mounting in virtually any location—on benches, pedestals, etc. Revisions in previously specified dimensions of these "standardized" presses include an increase in platen depth from 8 to 9½", with increase of ½" to 5½" in throat and an increase in base dimensions from 14x22 to 17x24½". While designed primarily for work on small parts, the large amount of throat clearance (between ram and column) permits operations on quite large parts.



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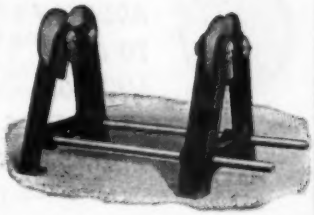

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Platen width is 14" with slot 2½". Net weights are 300 and 350 lbs. for the two models respectively. Overall height has also been increased.

By the use of special coolant equipment, light broaching can be done on these machines. However, for such work, Colonial "Senior" presses are usually recommended since coolant equipment is a "built-in" feature.

Control of ram stroke is through a four-way valve, operated manually by a single-lever control, with ram stopping at bottom of stroke or automatic return and by the use of adjustable stops. The ram operating cylinder is integral with the massive one-piece column of machine for maximum rigidity. Ram speed down is 30 ft., per minute, with return speed of 60 ft. per minute on both models.

The hydraulic system includes an adjustable pressure relief valve so that maximum ram pressure may be adjusted to any desired limit within capacity of machine. Thus ram pressures may be limited if desired, to prevent damage of parts during assembly. Provision is made for installation of a pressure gage on column, for use in assembly work where exact press-fit tolerances are important.

The completely self-contained operating system in both models includes constant delivery pumps of 1000 lbs., capacity submerged in an oil reservoir in base of press column. The pumps are direct-driven through flexible couplings from standard electric motors vertically mounted within frame of column. A 1-h.p. motor is used for the ½ ton Press, and a 1½ horsepower motor for the larger 1 ton unit.

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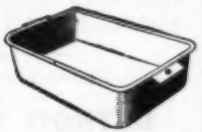

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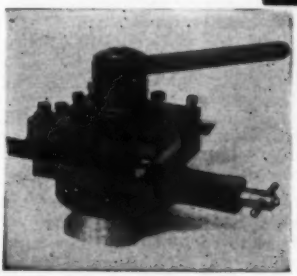


With Colwell Tool Post Turrets

Speed up production with these low-cost turrets that pay for themselves on one simple job! Fit lathes from 9"-20". Carry 4 tools. Positive locking device. Quickly, accurately indexed. Write today for price list and specifications and see for yourself how easily you can afford Colwell turrets.

SEND TODAY FOR FOLDER !

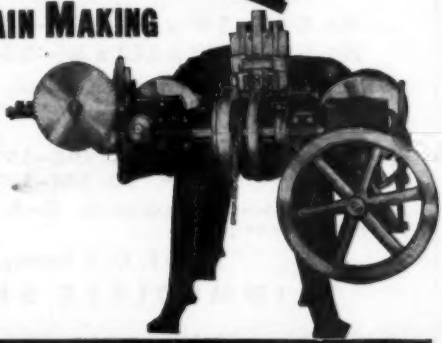
S. G. Colwell
25 Congress Ave., Providence, R. I.

STRONG STANDARD SIZE CHAINS
WITH THE
NILSON CHAIN MAKING MACHINE

To make a full line of standard size chains as known to the trade, Nilson makes the four necessary sizes of machines. Chains produced by these machines are strong, durable, safe and flexible.

20% increase in strength due to the fact that the ends are tucked in, leaving them perfectly smooth on both sides, enabling one to run them through the hands without injury. They will run accurately on sprockets for conveyors or power transmission purposes.

Let us send you complete details.



The A. H. NILSON Machine Co
BRIDGEPORT, CONN., U.S.A.

Improvement in Bandsaw Accuracy to Save Steel

With expensive steels at a premium and with bar stock of all kinds on priority, it's good news to manufacturers that the Machine Tool Division of Kalamazoo Tank & Silo Co. has improved the accuracy of its bandsaw to the point where additional savings in material can be expected.

The new saw has a capacity of 8" round stock and 8" x 16" flat stock. New yoke and arm and new hydraulic vise design allow wafer thin cuts the full width of the throat with variation of only a few thousandths in thickness, permitting cutting to closer dimensions and thus saving steel. A larger model with 8"x22" capacity is also available.

New, removable, clip-type brushes lengthen the life of saw blades by sweeping the saw completely clean of metal chips at each revolution. This feature also protects the gears from metal chips, dirt, and dust.

The saw can be made completely portable on caster mounts. Light weight combined with sturdy design gives easy one-man mobility to any spot in a plant. Such portability saves set-up time and also saves considerable handling of heavy work. It can be plugged into any electrical outlet; no coolant is required.

Other features of the new saw include 100% ball bearing equipment, three speeds, automatic gravity feed, ball bearing blade guides, constant belt tension, hydraulic frame control to cushion drop, and full enclosed work and gear reduction drive. New tip off block allows fast and accurate measurement of stock.

The saw requires only 25" x 65" of floor space, weighs 625 pounds and requires only ½ h. p. motor for the heaviest work. All grades of saw blades are available.

Welded Stainless-Clad Car

What is believed to be the first tank car in which the tank is constructed entirely of welded stainless-clad steel,

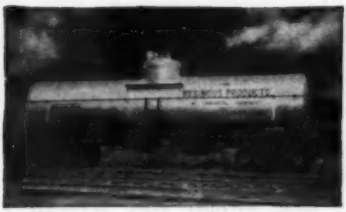
Save back work and all useless motion with the Nilson Tilting Wire Reel.

A foot lever is tripped, the guards removed, a coil of wire slid upon the carrier, the guards replaced and set screws tightened, an easy lift, and the counter-balancing weight does the rest, bringing the tilting section to an upright position, ready to feed the wire into the machine. Simple in operation, and may possibly save your men from sprains, resulting in lost time and production.

Send for bulletin No. 51 and learn how to save in other ways too.

The A. H. NILSON Machine Co.
BRIDGEPORT, CONN., U.S.A.

was recently completed by General American Transportation Corp., at their Sharon, Pa. plant. The tank required 15,000 lbs., of "Silver-Ply" stainless-clad steel, supplied by the Jessop Steel Co., Washington Pa.



Use of Jessop "Silver-Ply" in this equipment prevents contamination of the contents of the tank, as the stainless-cladding on the inside of the tank successfully resists chemical attack which would have taken place had ordinary steel been used.

"How to Train Shop Workers"

A 126-page book on training shop workers is announced by American Technical Society, 850 E. 58th St., Chicago. It is in mimeographed form and published at $1.25.

"How to Train Shop Workers," is by C. A. Prosser and P. S. Van Wyck, both of Dunwoody Institute, and is based on a manual prepared for the N. Y. A. It is intended for use by shop foremen for training workers in any mechanical occupation and also as a manual for instructors in vocational training classes of all types.

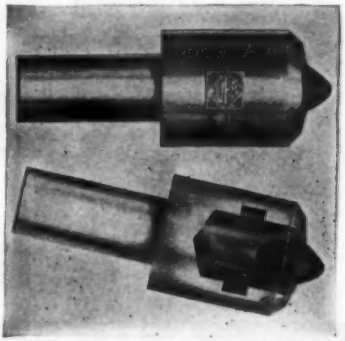
Parts of this manual discuss the duties and responsibilities of the foreman or shop instructor and his function as a leader or "human engineer." The body of the text is concerned with planning what training to give, finding what to teach by job analysis, methods for putting over what is to be taught, and correct methods of training the worker. Thirty-two charts elucidate the text.

NEW!
PORTABLE—LOW COST
CONTROLLED FLOW
GRAY Coolant PUMP

SAVES WEAR—SPEEDS PRODUCTION
on Lathes, Drill Presses, Grinders, Tappers, Abrasive Finishers, Cut-off Saws and Small Mills.
Write for Literature
GRAY-MILLS CO.
215 W. Ontario St. Chicago, Ill.

New Design by Diamond Tool Co.

The Diamond Tool Co., 938 E. 41st St., Chicago, manufacturers of "Big-Hed" Diamond Nibs announces a new design feature which is to be incorporated in all its diamond nibs in the future.



This new feature which is known as the "Loc-Key-Set," consists of two internal locking keys that are integrally cast on the slug-holding nib by forcing the molten metal into two internal key seats milled in the nib head. It is claimed that diamonds set in this manner never shift, turn or loosen in operation, permitting micrometer adjustment of each pass.

Other features claimed for these nibs are.—a large diameter head which draws heat away from the grinding point and dissipates it rapidly, providing cooler dressing and preventing tool expansion and permitting the holding of closer tolerances; and corrected face angles which permit greater tool clearance without loss of tool strength or rigidity.

New Stubby Box Wrench

The Plomb Tool Co., Los Angeles, has developed an extremely useful set of four short, 12 point, offset box wrenches, with an obstruction clearance of 9/16" and overall length of 5 to 6½".

Made for those places recessed or

AMERICA COMMENDS ITS ACCURACY!

The KALAMAZOO METAL-CUTTING BANDSAW

New hydraulic controls, new precision design permit wafer-thin cuts with positive accuracy to thousandths inches—saves expensive steel. Portable, sturdy, ball-bearing equipped throughout — has hydraulic cushioned action. Write today for catalog giving complete specifications.

Ninety-five out of 100 defense plants require one or more of these precision saws. Used by army, navy, aircraft and shipyards.

★ 8'x16' *and* 8'x22' CAPACITIES ★

MACHINE TOOL DIVISION
KALAMAZOO TANK & SILO COMPANY

508 HARRISON STREET
KALAMAZOO, MICHIGAN

2 STANDARD BUSHING GROUPS REDUCE SPECIAL REQUIREMENTS

★ Yes, when you buy your jig bushings from Acme, you get an *extra* standard line to select from, because Acme can furnish A.S.A. (American Standards Ass'n.), plus Acme standard bushings.

Where only A.S.A. bushings are available, your requirements may be special. But, at Acme, your A.S.A. "special" may be listed in the Acme line of standard bushings.

So, for the largest line of standard bushings available, see what Acme has to offer. Write for your FREE Acme catalog today. It will help with the selection of bushings for your jigs and fixtures.

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Specialists in Flat and Cylindrical Lapping

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Sellers

Fast Production Needs Correctly Ground Tools!

Grind them on a

SELLERS TOOL GRINDER!

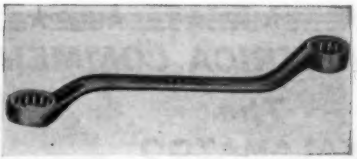
More vital than ever before is the need for correctly ground tools and tool bits—for it is only when tools are properly shaped and have the right clearance and rake that they can take heavier cuts at higher speeds for fast production work. Sellers Tool Grinders provide a simple and efficient means of accurately producing correct tool shapes and of *duplicating these shapes on any number of tools.*

To keep in step with today's production demands, you need a Sellers Tool Grinder in your plant.

Write for the new Sellers 4-T Tool Grinder Bulletin.

WM. SELLERS & CO., INCORPORATED

1616 Hamilton St., Philadelphia, Pa.



hidden with limited space, their compactness greatly increases the utility of this type wrench.

The short shank may be held almost entirely within the hand and accurately placed in position with greater speed and safety.

Made of fine steel, full plated with polished heads, they are sold as a set in a canvas bag No. 8100A, or singly—if desired,—and come in the following openings: — 8160 — 3/8x7/16; 8161 — 1/2x

Tungsten Carbide Standard Tool Bulletin

Tungsten Carbide Tool Co., 7171 East McNichols Road, Detroit, announces a four page bulletin covering its new line of "standard" cutting tools. Complete specifications for 92 different types and sizes of carbide tools are given, as well as prices. Steel-cutting and cast iron as well as non-ferrous cutting tool grades are given, with tips available of any of the following materials:—Vascoloy, Carboloy, Kennametal, or Firthite. All tools are shipped with cutting edges diamond ground and with shanks colored grey or black to identify them as to grades.

SAVE TIME when 'time is short'

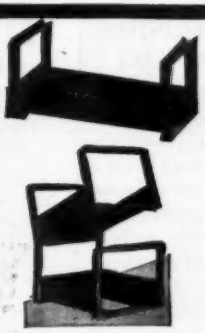
TOOL POST TURRETS FOR ALL LATHE SIZES

Saves on Setting Up — Saves on Repeat Operations

WRITE

C-W-C CORPORATION

HAWTHORNE, CALIFORNIA



NEW BOX STORAGE speeds parts handling

Every box is "on top of the pile" when you use STACKRACKS. Heavy containers slide in and out like drawers—you can get at the contents of any one quickly and easily without disturbing the others. Patented STACKRACKS, to fit your boxes, interlock to form storage units of any size, shape or capacity.

Write today for full information and low prices. Stackbin Corp., 55 Troy St., Providence, R. I.

STACKRACKS
"STACKED AND STILL ACCESSIBLE"

MARSCHKE GRINDERS ARE EFFICIENT!

Lift heavy work pieces to the grinding wheel? Use slow hand tools on angular or contoured patterns? Not with Marschke Swing Frame Grinders, for Marschkes take the wheel to the work. You can count on Marschke Swing Frame, Floor Stand and Pedestal Grinders for the smooth, true wheel rotation and correct wheel speeds essential for greatest cutting efficiency and wheel economy. It will pay you to get acquainted with Marschkes' 18 significant features!

THE MARSCHKE LINE

Write today for Marschke Bulletin to VONNEGUT MOULDER CORP., 1805 Madison Ave., Indianapolis, Indiana.

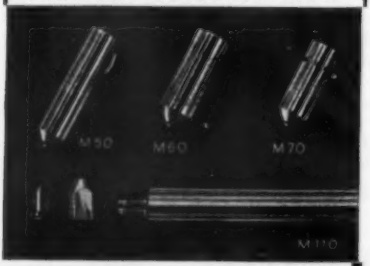
STEEGE MOTOR DRIVES FOR DEFENSE
GUARANTEED FOR FIVE YEARS

No chance of breakdown, doing a good job powering machines for defense production. No noise, floating cone, results 100% power. 8 years of production proof of durability. Easily installed.

PRICED AT $40. AND UP. FOR LATHES, SHAPERS, MILLERS, ETC. IMMEDIATE DELIVERY. *Send for descriptive pamphlet.*

W. L. STEEGE MACHINERY CO.
548 W. Monroe St., Chicago, Ill.

Dia-Brasive
DIAMOND DRESSING TOOLS



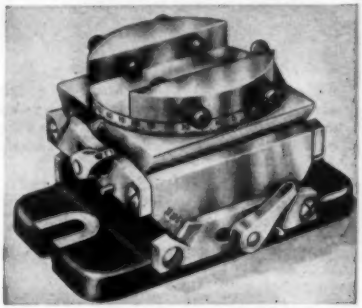
INCREASE DEFENSE PRODUCTION FROM GRINDING WHEELS

More output and better work will result if wheels are kept sharp and true with MEYERS DIABRASIVE DIAMOND DRESSING TOOLS. All types, all sizes. Standard and special. *Ask for literature.*

W. F. MEYERS COMPANY, INC.
DEPT. BB BEDFORD, INDIANA

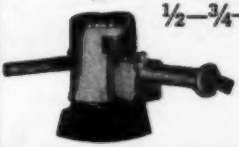
Hammond Any-Angle Tool Vise

This new vise is designed for grinding chip-breaker grooves into the tips of carbide tools. Formerly furnished only as part of the Hammond "4" Chip Breaker Grinder, it is now offered as a separate unit by Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Mich. Complete in itself, the vise is mounted on a lug base which is easily affixed to a machine table.



The vise is constructed on a double-cradle principle permitting adjustment of grinding angles on three separate planes. Two closely machined steel blocks, rounded on bottom, are cradled into each other at right angles. After adjustment they are solidly locked together by tightening cam locks operating in machined segments at ends of the respective blocks. Mounted atop

CUTS GRINDING COSTS
½—¾—and MORE



HEAVY DUTY
3 Phase
60 Cycle
No Brushes

GASTON POWER TOOLS
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QUALITY TAPS

FOR EVERY TAPPING JOB

With WINTER Taps and Dies you can be sure that threads are being produced to the most exacting specifications — and economically!

There's a Winter tap and die for every threading job.

Write Dept. B for Free Tap Data Booklet.

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WRENTHAM, MASS.—BRANCH FACTORY: DETROIT, MICH.

A Division of NATIONAL TWIST DRILL & TOOL CO.

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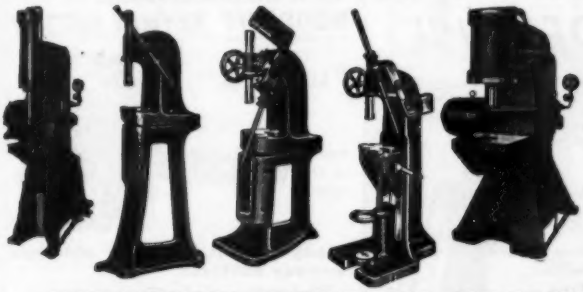
For AIRCRAFT and MUNITIONS



1883

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PRECISION WORK IN REARMAMENT

65 Standard Styles and Sizes. Manually operated presses ¼ to 35 tons pressure. Motor driven hydraulic presses 1½ to 30 tons pressure.

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GREENERD ARBOR PRESSES

NASHUA Est. 1883 NEW HAMPSHIRE

these two blocks is a flat, circular piece which swivels 90° from center of any of the four sides of the block immediately below. This piece carries the vise jaws, holding tools firmly by means of Allen screws.

The manufacturer emphasizes that the principle of closely fitting steel blocks which may be tightly locked together permits no vibration or deflection, thereby insuring maximum accuracy of the grinding angle selected. Each tilts 15° either way from horizontal, and this adjustment combined with 360° selectivity of the circular piece at top provides almost any angle desired. A bulletin is available describing this useful tool vise.

Reid Master Surface Plates

The Tool Engineering Service Co., Inc., 243 Washington Ave., Nutley, N.J., has brought out a line of Reid master surface plates designed for use in laying out, inspecting, assembling, and checking work requiring extreme accuracy. The line includes eight sizes, the smallest being 12" wide, 18" long, and 3" high, and the largest 48" wide, 72" long, and 12" high.

These master plates are normalized and weather-seasoned. They are available with either scraped or planed finish. The heavily webbed underframes of these plates are designed for three-point support. All planing and precision scraping operations are performed with the plates resting on their three supporting points.

2 OR 3 DAYS DELIVERY ON
BAKELITE SPUR PINIONS
GEARS OF EVERY DESCRIPTION
THE GREAVES MACHINE TOOL CO.
CINCINNATI, OHIO PHONE, WOodburn 6312

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For high speed production, the GRANT noiseless spinning and vibrating hammer types „are "tops".
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G. E. STATION - BRIDGEPORT, CONNECTICUT

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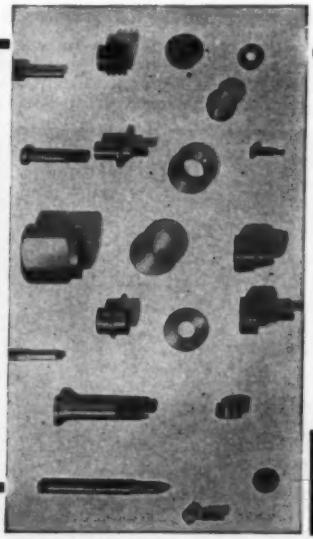
WOODRUFF KEYWAY CUTTER
"Doubled Production"
according to reports.
Many advantages over old-type keyway cutters:
More cutting edge — Gives shearing cut
Cuts 50% faster — Easy to sharpen
More cuts per sharpening
Full line standard sizes, round or square end shank, in stock. Special size cutters made to order. Territories available.
Circular with prices, on request.
ABER ENGINEERING WORKS
1613 Flett Ave. Racine, Wisconsin



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SCREW MACHINE PRODUCTS

Capacity in all materials: multiple spindle to 2⅝"; single spindle to 4¼". Accurate, dependable.

We also offer facilities for

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Estimates gladly submitted
Send samples or blueprints.

Catalog on request.

RHODE ISLAND TOOL CO.
148 West River St., Providence, Rhode Island
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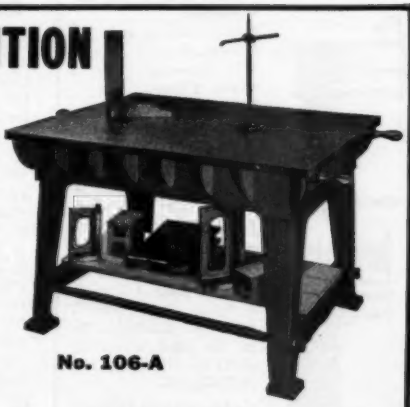
A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Shipping weight 1200 lbs.



No. 106-A

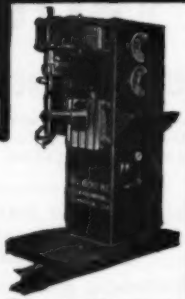
We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. *Write today for full information.*

J. C. BUSCH COMPANY ENGINEERS AND MACHINISTS SINCE 1907
165 SO. BARCLAY ST., MILWAUKEE, WIS.

SOLVED!

Your WELDING PROBLEM



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- Bronze
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- Nichrome
- Tin Plate
- Copper
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There is an EISLER WELDER for every purpose.

Butt Welders to weld from .010" to ½" dia. metal. We make all kinds of Standard & Special TRANSFORMERS A. C. ARC WELDERS—100 to 400 Amps. LARGE or SMALL QUANTITY CONTRACT SPOT WELDING.

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CHAS. EISLER

EISLER ENGINEERING CO.

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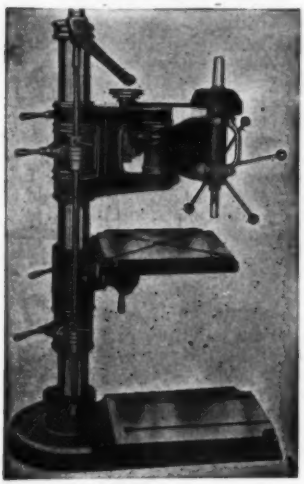
Low-Speed Machines Balanced

Low-speed machines, such as waterwheels and Diesel-driven generators rotating as low as 100 r. p. m. may now be dynamically balanced on their own

pedestals. This extension of the balancing range from the previous limit of 600 r. p. m. has been made possible by means of a new pick-up developed by Westinghouse engineers, which indicates vibrations of double amptitude as low as 0.003" at 100 r.p.m., the lower limit of its field of use. The newly developed pick-up is used with a standard portable balancing unit and conventional sine-wave generator.

The difficulty with low-speed balancing has been that a pick-up capable of measuring vibrations of low frequencies must have much lower natural frequencies than the vibrations measured. To furnish correct indication, a vibration pick-up and its mounting should have a natural frequency of no more than one-half the frequency of vibration of the machine to be balanced. Thus for a 100 r. p. m. generator, for example, the natural frequency of the pick-up must be not more than 50 cycles per minute. To get a body with such a low frequency has



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Increase Profits . . . Speed-up Production

End Worker Fatigue . . . Increase Efficiency

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DRILLMASTER RADIAL DRILL

Economical in operating and first cost, this floor type, heavy duty, precicion-made, well-balanced Radial offers many features that merit your careful consideration. Drilling to the center of a 36" circle, No. 2 Morse Taper and heavy duty ½ HP ball bearing motor. The full floating, ball bearing spindle assures free and sensitive operation at all speeds.

Send TODAY for bulletin giving full details.

Wm. C. Johnson & Sons Machinery Company
St. Louis, Missouri

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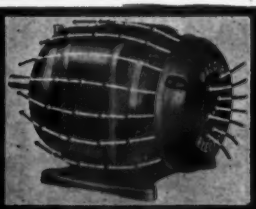
Cool-running

MOTOR



Illustrating forced air-movement over entire exterior of motor frame.

BALDOR Streamcooled Design provides a totally-enclosed, ball-bearing motor with an unfailing, NON-CLOGGING cooling system.
BALDOR Glass-insulated motors withstand higher temperatures SAFELY and provide MORE H.P. in smaller frame sizes.
These and many other features at NO EXTRA COST to you.

BALDOR

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BALDOR ELECTRIC CO.
4368 Duncan Ave., ST. LOUIS, MO.

BETTER MOTORS

QUALITY CUTTERS

The Standard of QUALITY

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest *quality* and *service* at *attractive prices.*

Write today for prices. *Few Territories Open.*

QUALITY TOOL WORKS
Market St., Waukegan, Illinois

CLARK FACTORY TRUCKS

No. 250

SKIDS TANKS
RACKS WHEELS
BINS CASTERS

No. 124

ALL STEEL WELDED TRUCK CORP.
ROCKFORD, ILL.

heretofore meant the use of large masses, making the instrument unwieldy.

The new pick-up employs something like an inverted pendulum. The natural frequency of an inverted pendulum can be made extremely low by weakening the restoring springs so that it is barely stable in a vertical position. To permit the use of this pick-up in all directions, the effect of gravity has been neutralized by laying the pendulum on its side, and the force previously supplied by gravity is furnished by a toggle-like spring mechanism to the pendulum.

Lessons In Welding

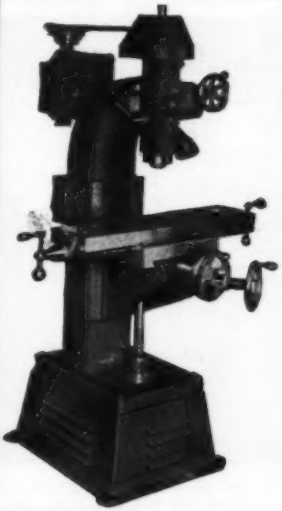
Practical Lessons In Arc Welding by W. J. Chaffee, 100 pages, 77 illustrations, paper cover, published by Hobart Brothers Co., Troy, Ohio. Third edition in seventh printing. Over 225,000 copies of book already sold. Price postpaid anywhere 50 cents. Special edition written in Spanish $2.00.

This concise arc welding book, written in easy—to—understand English, offers students, instructors, engineers, and executives an abundance of practical arc welding data and lessons. Patterned after the course of lessons offered in the Hobart Trade School, this book leads the student easily throughout all the fundamental stages of arc welding. Forty two complete arc welding lessons are covered in the book.

Group of lessons include:—Striking and manipulating the arc; welding with bare electrodes; welding and cutting with coated electrodes; welding light gauge steel. Each lesson gives complete instructions for practicing the exercise—material, position, proper electrode, current value, and polarity setting.

The author, deemed by many as one of the most practical welding experts in the field today, stresses practice as the means for acquiring welding proficiency—keeping technical material to a minimum.

Copies of the book may be obtained directly from the company or from anyone of its authorized distributors.



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THE DEFENSE PROGRAM

JACKSON Vertical and Horizontal High Speed

MILLING MACHINES

A new plant with increased facilities has made it possible for us to accept a limited number of orders for prompt shipment. High Grade in every respect and especially designed for High Speed Precision and Production Milling and Boring.

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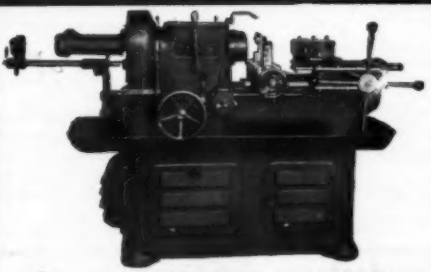
Jackson Machine & Tool Company Sales Division
JACKSON, MICHIGAN

Morey



No. 2G & No. 3 Turret Lathes

Motor Drive
Infinite Spindle Speeds

	No. 2G	No. 3
SPEEDS from	90 to 1800 R.P.M. or 180 to 3600 R.P.M.	60 to 2100 R.P.M. or 100 to 3600 R.P.M.
CAPACITY	1"x6½" turning length	1½"x9" turning length Made in Plain and Universal Types.
	Ask for Bulletin No. 629	Ask for Bulletin No. 727

Timken bearings for the main spindle —all others anti-friction.

Any spindle speed you want—a direct reading dial shows when you've got it.

Permits the use of carbide tools for fast cutting.

Turret clamps and unclamps automatically.

Equally effective on second operation and chucking work.

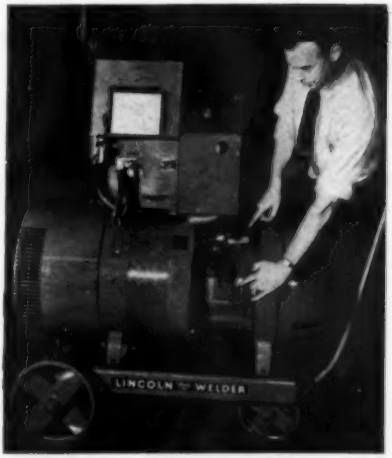
MOREY MACHINERY CO., INC.
410 Broome Street New York, N.Y.

Protecting Welding Sets Against Burn-Out

Complete protection against heat or excessive current, or both, is claimed for a new protective control device for arc welding machines just announced by The Lincoln Electric Co., Cleveland, Ohio.

According to the manufacturer, the new development creates advantages not previously available with conventional welder protective devices. It is said that a welding machine equipped with this new device, can be operated at maximum capacity for long periods without harm.

The protective control device, consists of two current transformers (upper devices in illustration), primaries of which are connected in series with motor leads and the secondaries supplying power to operate two snap-action thermostats which are mounted directly on motor lamination (lower device in illustration). These thermostats are connected to the lamination in such a way that they operate by means of heat conduction as well as by current passing through thermostat. The protection provided by this device is explained in this way by the manufacturer:



1—If welder is being operated in a very hot room or an oven and it exceeds the safe operating temperature, thermostats will trip open.

2—If motor is cold and excessive currents which will eventually damage the motor, flow for a short period of time, the thermostats will operate before motor reaches an unsafe temperature.

3—If machine is started on single phase lines, the switch may close, but the excessive heating of thermostat caused by the single phase locked current will open the thermostat and stop machine.

4—If machine is running and one fuse blows so that motor is operating single phase, if load on the machine is sufficient to overheat motor the thermostats will trip out.

5—If rotor is locked with normal three phase power applied, thermostats will open the circuit due to the high current.

6—If welder is operated for long periods of time at sustained overloads, both high input current and high motor temperature combine to open thermostats.

The thermostats automatically reset when motor returns to a safe operating temperature or when current is reduced, and no manual operation is required to start machine, except pushing the start button.

First Manufacturer of Adjustable Limit Snap Gages in U. S.

A G D Standard

Plug Gages—Adjustable Limit Snap Gages

Adequate stock ready to grind to special specifications

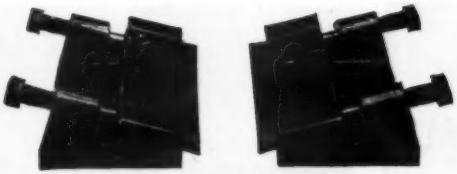
Priced on Cost—not on Demand

JAS. CLARK

143-17TH AVENUE, PATERSON, N. J.

Successor to

Jas. Clark Jr. Pneumatic Tool Co. and American Gage Co.



HART'S
Divided Machine Vises

These Vises will hold work the full length of the table, if necessary. Useful on planer, milling machine, surface grinder or drill. They adapt themselves to any shape and can be used on sides of table as well as ends. The Jaws are tool steel and hardened, the angle holding the work down on the table.

Size of Base	**5x7 inches**
Size of Jaw	**3x6 inches**
Height at highest Point	**2¾ inches**

When writing for descriptive circular kindly mention the BLUE BOOK.

HART MACHINE CO.
26 Mather Street, - Dorchester, Boston, Mass.

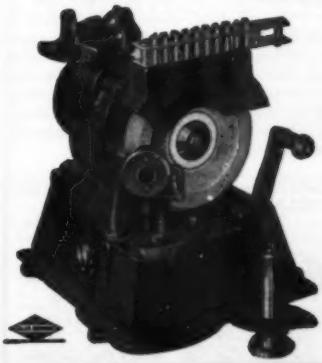
HART'S
Milling Fixtures

These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes—¾" to 4".

SAWS BLACK DIAMOND TOOLS

Grind *Your* Drills On "BLACK DIAMOND" Precision Drill Grinder

SAWS BLACK DIAMOND TOOLS



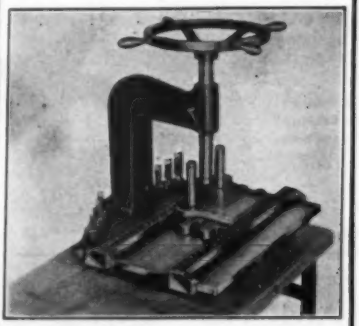
Even an unskilled operator can do a precision job of drill grinding—handles sizes from No. 60 wire gauge to ¾"—easily, quickly and without any complicated adjustments. Saves time, drills and possible damage to the work.

Let us send you Bulletin No. 121-H.

BLACK DIAMOND SAW & MACHINE WORKS, INC.
NATICK, MASS.

Save TIME TAPS TROUBLE with the Ne

VIKING TAPPER



You save time because the Viking Tapper eliminates the wasting of valuable time by highly paid skilled men trying to tap holes accurately by hand. One fifth the time is required.

You save taps because tap breakage is practically done away with. This enables the use of high speed ground thread taps at lower cost than carbon taps. The savings on taps alone will pay for the tapper in a short time.

You save trouble because Viking Tappers take the trouble out of tapping.

For Precision Tool Room Tapping use the Viking Tapper. Capacity ¼" to ⅜".

SEND FOR CIRCULAR

THE VIKING TOOL & MACHINE CORP.

14 MAIN St., BELLEVILLE, N. J.

A special circuit allows starter button to be held "in" after welder thermostats have been tripped. This allows machine to rotate with no load and welder ventilation speeds up cooling of the welder after the trouble has been rectified.

Industrial Eye Accidents

In 1940 industrial eye accidents cost more in time and money than strikes.

Reporting that 8,455,000 man-days were lost through eye accidents in comparison with 6,700,000 lost through strikes, Ira Mosher, vice-president and general manager of the American Optical Co., warns that industrial production for the National Defense Program will suffer seriously unless greater eye safety precautions are taken.

In round figures, he stated these eye accidents cost American industry $50,000,000 in lost time, medical expenses and compensation.

Mr. Mosher also reported that the average compensation and medical cost for an eye injury is $343, which compares with $194 for all other types of occupational accidents.

He specifically referred to the state of Ohio where eye injuries in 1940 were exactly the same in percentage figures as those of 1926, despite 14 years of intensive safety education. The severity of these eye injuries, however has decreased, he added.

Pointing out that American industry is mobilized for national defense and every trained worker is needed, Mr. Mosher declares that eye accidents and the consequent loss of time and money would be materially reduced if workers wore safety gogles on all eye-hazardous jobs.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular

NIELSEN TOOL & DIE COMPANY
1859 Gardner Ave.
Berkley, Mich.

KEEP 'EM SEEING...
with Work Well Lighted!

Eye strain saps energy... reduces output. **Continental Machines, Inc.** say: "VIMCOLIGHT is a very necessary part of the DOALL machines". Precision work, speed and accuracy require **sight-saving lighting.** Vimcolight non-glare, on-the-spot lighting is designed by industrial lighting specialists. Are **your** machines Vimcolighted?

VIMCOLIGHT

VIMCO MANUFACTURING CO.

SPECIAL HEAVY DUTY
110 V—220 V—440 V

DEMAGNETIZERS

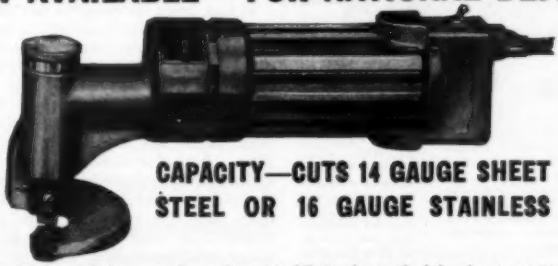
SIZES UP TO 18"x24"

Rapid Delivery

R. B. ANNIS COMPANY
INDIANAPOLIS, IND.

GES *Electric Hand Shears*

NOW AVAILABLE — FOR NATIONAL DEFENSE



CAPACITY—CUTS 14 GAUGE SHEET STEEL OR 16 GAUGE STAINLESS

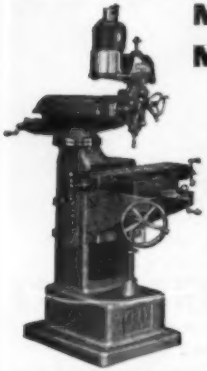
This new sheet metal shear was brought out to fill the demand of the sheet metal industry for a very light weight but powerful, fast cutting tool, capable of cutting accurately to the line along straight lines as well as along small curves.

This sturdy shear will give a life time of service. The ball bearing "Grip" type Universal motor ⅛ horse power will operate on either AC or DC and 110 or 220 volts, 25 to 60 cycles. This new model has fuse protection incorporated in switch box. Alloy Steel cutters—will cut at the rate of 6' 6" per minute on 14 gauge sheet steel. *Write for further information.*

A. KLINGELHOFER, INC.

103 LAFAYETTE STREET **NEW YORK, N. Y.**

FRAY NO. 7-B
RAM TYPE UNIVERSAL MILLING MACHINE



No other machine has the same range of operations with ONE work set-up.

FRAY MACHINE TOOL CO. 501 W. Windsor, Glendale, Calif.

DIAMONDS for Defense

NEW DIAMOMD NIB

BIG-HED "Loc-Key-Set" (Pat. Pend.) Nibs always provide better dressing and truer, sharper wheels because they dress cooler, permit closer tolerances. Diamond cannot shift and slug will not slip because new Loc-Key-Set feature locks diamond-holding slug to Nib with unique internal key construction, permitting micrometer control of tool pass.

★

BIG-HED "Loc-Key-Set" Nibs are now in stock at our local service and stock branch. Loc-Key-Set construction now used in all D.T. Co. Diamond Dressing Tools. Call or write for details.

PAT. PEND.

DIAMOND TOOL CO., Not Inc. 938 E. 41st Street CHICAGO, ILL.

Facilitating Inspection

Magni-Ray, a new illuminated magnifier which plugs into the standard 110 volt circuit, is announced. The device has an unusually wide magnification field and offers scientifically correct lighting directly on the object in the field thus shutting off reflections.

It has been developed particularly for use in defense industries to quickly detect troublesome and costly sources of delay and waste, such as blow holes in castings, machine tool beds, tools and dies, cracks in steel after hardening, imperfect welding seams and burrs and poor finish on small parts, screws and pins. Also for setting of tools on precision lathes, thread grinders, and on jewelers' watch making machinery. It may also be used for the reading of blueprints, fine dials and graduations, maps and recording instruments.

It may be removed quickly from its sturdy stand and attached to a machine tool so that work may be watched during operations. The universal angle clamp permits turning to any angle, raising and lowering quickly for many applications.

Two types are available; one has a 3" lens and the other has a specially de-

signed 2" wide achromatic lens with a magnification power of three plus. The three elements in this achromatic lens are produced from highly specialized glass, eliminating distortion. Full information may be obtained from the George Scherr Co., 122 Lafayette St., New York, N. Y.

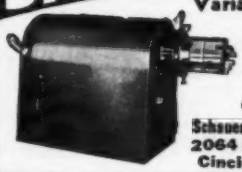
Booklet Simplifies Steel Comparisons

Because the AISI Standard steels are recognized as "here to stay," industry finds itself struggling with the interpretation of the new Standard AISI Steels in terms of the old SAE. Most timely and helpful is a pamphlet published by Joseph T. Ryerson & Son, Inc., comparing the two systems of steel identification (SAE, the Society of Automotive Engineers, Inc.; and AISI, the American Iron and Steel Institute).

The Ryerson booklet contains all the latest official data for both of these new systems of identification. Direct comparisions of the equivalent or alternate steels are given in quick tabular form. The SAE and AISI systems are explained. Complete analyses ranges for straight carbon and alloy steels of both systems are listed, and the average physical properties of AISI and SAE steels are given in their proper relationship.

Copies may be obtained from Ryerson Steel-Service plants in Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, and Jersey City.

SCHAUER
Speed Lathes
Variable Speed



Ideal for lapping filing, polishing small metal and plastic parts.

Write for Catalog 400.

Schauer Machine Co.
2064 Reading Rd.
Cincinnati, Ohio

DOG-EARED
CHARTS *Tell The Story of*
MAGNA-SINE USE

In the use of the Magna-Sine, standard gage blocks are employed to tilt the sine table to the exact angle required for any particular job. To aid in quickly determining the proper gage blocks to be used, a chart known as the Magna-Sine "Table of Constants" was compiled.

Recently, a request was received from a Magna-Sine user for additional copies of this chart. As his reason for writing, he said, "so much use is being made of your Magna-Sine chucks that our charts are worn out".

Today, as never before, Magna-Sines are "paying out". They are saving hours and hours of valuable time which otherwise would be spent in securing angular set-ups by old-fashioned methods. The machines on which they are used operate at maximum productive capacity. They assure extreme accuracy whether they are used in machining operations or for inspection purposes.

WRITE FOR COMPLETE INFORMATION

The MAGNA-SINE

ROBBINS ENGINEERING CO.
639 Mt. Elliott Ave. • Detroit, Mich.

OPEN THE WAY TO GREATER PROFITS

BY USING S & S HINGES

BUTTS AND CONTINUOUS LENGTHS — *for* GUARDS — CABINETS — CASES — BOXES — LUGGAGE

WRITE FOR CIRCULAR

S & S MACHINE WORKS

HARDWARE DIVISION

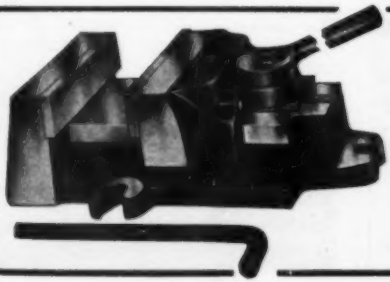
4839 WEST LAKE STREET CHICAGO, ILLINOIS

Speeding Non-Ferrous Quenching Operations

An automatic roller grid developed by the Lindberg Engineering Co., 2450 West Hubbard St., Chicago, for use with the "Cyclone" forced convection box type furnace, speeds non-ferrous quenching operations.

The roller grid on this type of installation, which has particular use in heat treatment of aluminum alloy aircraft parts, is powered by an air cylinder which pushes a carriage to work chamber where the roller grid is automatically engaged. The carriage then quickly pulls roller grid along tracks from work chamber out into the open where work can be removed rapidly for quenching. The grid is then reloaded, and automatically moved back into the work chamber where carriage disengages roller grid, and moves back to allow the hand controlled air operated vertical lift door to lower into place.

Heating is by the "Cyclone" principle with a high velocity fan which forces large volumes of air under pressure and at velocities of around two miles a minute over heating elements and through all parts of work chamber. Heating is rapid, and all parts of charge are heated to uniform temperature. The heating elements consist of coiled



PLUNKET QUICK ACTION VISE

for DRILL PRESS OR MILLING MACHINE

Designed for production work, using an eccentric motion to apply pressure to jaws. All eccentric parts are hardened to insure long life.

Eccentric motion moves jaw 5/16".

Size	Net Price
6" jaws, 1½" deep, opens 4"	$38.50

Pressure between jaws, with handle furnished 2200 lbs. Net weight 36 lbs.

WRITE FOR CATALOG

J. E. Plunket Machine Co., 1823 W. Lake St. CHICAGO, ILL.

A CLAMP for Every Purpose

Forged Steel
Quick Acting
Deep Reach
Welders

Sizes Available:
¾" to 10' opening
½" to 16" deep

Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co., 1945 WAVERLY AVE., CINCINNATI, OHIO

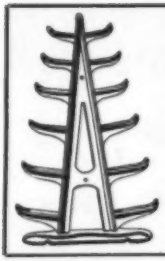
"SCHULTES"... The King of Motor Drives!

ALL HELICAL GEARED, UNSURPASSED IN POWER, EFFICIENCY, SAFETY AND COMPACTNESS

Write for Complete Detailed Specifications

WESTLOF TOOL & DIE COMPANY

4192 BELLEVUE AVE. • DETROIT, MICH.



"CHAMPION"
Steel Racks

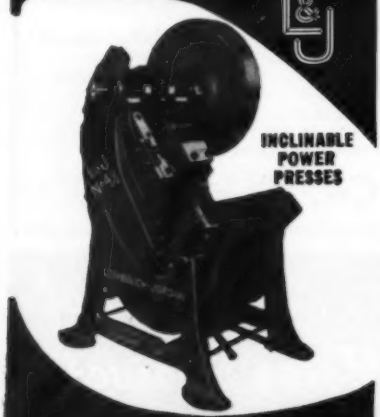
Save time, steps and money by keeping bar stock, shafting and pipe out of the way and off the floor.

Write for full details.

The Western Tool & Mfg. Co.
Springfield, Ohio

Standard Since 1911

L&J



INCLINABLE POWER PRESSES

L & J PRESS CORP.
successors to Lathbouch-Jordan Tool & Machine Co.
1625 STERLING AVE ELKHART INDIANA

nickel chromium wire, and are situated with fan in a separate chamber away from work chamber, but within furnace. Elements are situated in the separate chamber for two reasons, first:—to permit quick and easy replacement (a change can be made in 10 minutes without cooling down the furnace) and second—to prevent radiation from heat source to charge which would cause local overheating.

This furnace is available in five standard sizes with a temperature range of from 200° F. to 1250° F.

Speeding-Up Drive Deliveries

The Torq Electric Mfg. Co., 6605 Carnegie Ave., Cleveland, Ohio announces organization of a Rush Job Department. It is the job of this new section to help defense manufacturers get special drives more quickly. Its services include design, layout and fabrication.

The new Department got into action recently in helping a large electrical manufacturing company to swing over to defense production. Special mountings were needed to modernize and motorize a grinder. The unit was delivered in two weeks—whereas ordinary delivery probably would have taken five weeks or more.

Because of higher manufacturing costs, involving overtime labor, rates for this service are slightly higher than usual. Manufacturers requiring specially designed motorizing unts, to whom speed of delivery is important, are invited to check further with the company.

Micro Supreme
LAY-OUT DYE

PUT IT TO
YOUR OWN TESTS
FOR TOOL, DIE, PATTERN OR TEMPLATE LAYOUT ON METAL. A handy five-ounce can sent to you postpaid for . . . . . 60¢

MICHIGAN CHROME & CHEMICAL CO.
6330 E. Jefferson Ave. • Detroit

SHARPLY DEFINED SCRIBED LINES

NICHOLSON CONTROL VALVES

are made in two, three and four-way types for air, oil, water, steam, gas, etc., pressures to 5000 lbs. Style E is a general purpose valve for pressures to 300 lbs. Various metal combinations to suit any medium. Style J is for air and oil only, pressures to 125 lbs. Style H is a balanced hydraulic valve for pressures to 5000 lbs. We also manufacture foot, solenoid and motor-operated valves.

Style J

Style E

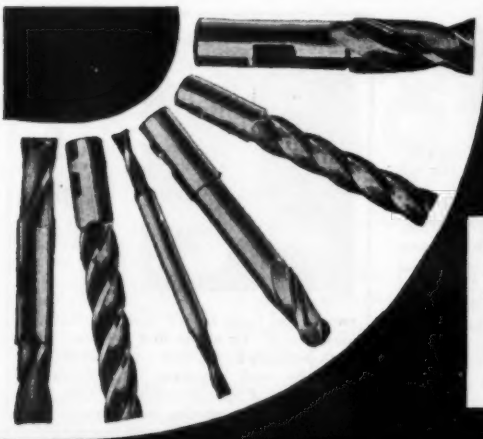
Style H

Bulletins on request.

OTHER NICHOLSON PRODUCTS: Mandrels, Arbor Presses, Flexible Couplings, Steel and Stainless Steel Floats, Steam Separators, Steam Traps, Air Separators, Air Traps, Air Vents, Etc.

W. H. Nicholson & Company

117 OREGON STREET WILKES-BARRE, PA.



Shear Cut— High Speed

END MILLS

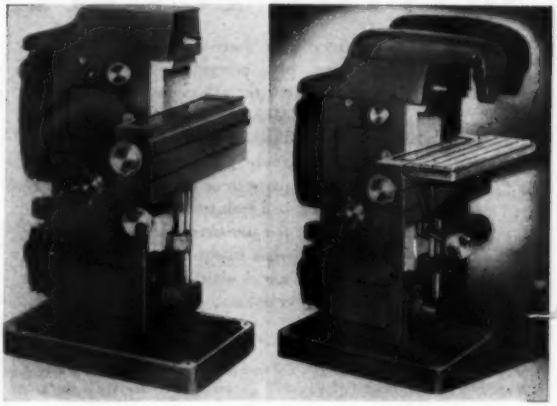
Shear Cut End Mills are offered in all standard sizes, single and double end.

Write for catalog and prices today.

PROGRESSIVE TOOL & CUTTER CO.

2345 WOLCOTT ST., FERNDALE, MICHIGAN

All-Purpose Milling Machine



A new type milling machine embodying several advanced design features is offered by the Portman Machine Tool Co., 17-19 Beechwood Ave., Mount Vernon, N. Y.

Vertical mounting of the carriage table, made possible through unique design of the saddle, permits mounting unusually large work or bulky fixtures under the spindle. With the additional feature of pivot mounting of the table elevating screw housing, work so large as to extend down to base of the machine may be clamped directly to front of the carriage table.

In addition, the ram type spindle housing member is movable across face of the table, enabling operator to set machine to the work, rather than make an entirely new work set-up on various operations.

Various integrally designed supplementary units available provide for all types of milling, either in the tool room or on production jobs. These units consist of two types of vertical spindle mountings for both high and low speed purposes; a trunnion mounted universal type table, to pivot 180° and adjustable to a maximum of 45° from the horizontal to provide compound angle work positions—a slotting head, and a rotary table. All of these features may be used independently or in conjunction with each other.

The standard machine is furnished with an adjustable arbor support head and a removable right angle work table. Eight spindle speeds ranging from 90 to 1760 r.p.m. are provided. Table feeds are independent of spindle speed and provide a range of feed from ¾" to 14½" per minute. Working surface of the vertical table is 32"x10½". Spindle nose to base of machine provides a full

SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs. Table swivels and locks in any position. Can be varied 15½° by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send TODAY for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO.
112 Webster St., Dayton, Ohio

"MORE THAN SATISFACTORY"

90% of All Cutting-off Troubles Eliminated by Luers Blades and Holders

When a nationally known manufacturer of aviation instruments says "Luers cutting-off blades and holders are more than satisfactory, meet our requirements in every way and are better than any we ever used", it's time for you to investigate.

Excessive friction causes most cutting-off troubles. Luers blades are tapered, providing adequate, frictionless back clearance. They are "T" shaped, thus reducing side friction. They cut a curved chip that expands without blocking the cut.

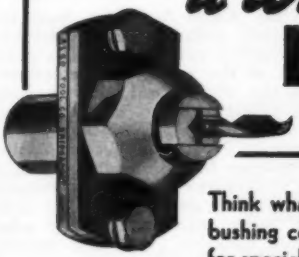
Tell us what automatic or hand screw machines you use.

Produced under license issued by John Milton Luers Patents, Inc.

WRITE FOR CATALOG

New illustrated catalog covers all exclusive features and gives full information.

EMPIRE TOOL CO. 8790 GRINNELL AVE. DETROIT, MICHIGAN



a drill chuck that HOLDS!

. . . . . AND WITHOUT THE USE OF BUSHINGS

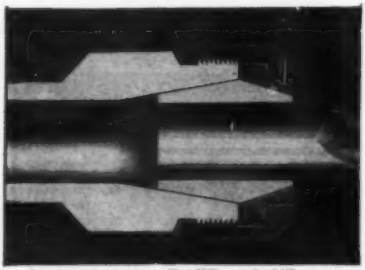
Think what this means to stepped-up production! No bushing costs — no delay in change-overs — no hold up for special size bushings. • Drill bushing stocks are now required only for old fashioned out-of-date holders.

To attain and maintain maximum production schedules make full use of mechanically-correct economical Alco Tools.

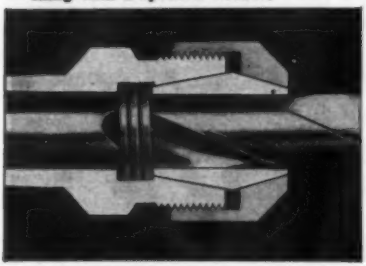
ALCO EFFICIENT TOOLS *Write for catalog*

THE ALCO TOOL COMPANY
835 HOUSATONIC AVE BRIDGEPORT CONN
DETROIT OFFICE — 908 STEPHENSON BLDG

2 NEW FEATURES IN UNIVERSAL COLLET CHUCKS



In larger sizes Z, ZZ and XZ nut tightens against a floating sleeve which reduces locking effort by 50%. Nut is jet black and fluted for tightening with a spanner wrench.



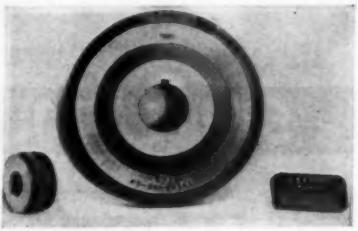
In smaller sizes OW, WW, and Y a release spring forces collet forward, as nut is loosened, automatically releasing the grip on the tool.

UNIVERSAL
Engineering Company
Frankenmuth, Mich.

46" depth without obstruction of any kind. The machine may also be equipped with complete coolant system, consisting of integral motor mounted coolant pump, piping and base reservoir with splash guards. Machine is powered by a 2 h. p., built-in motor, complete electrical equipment being furnished as standard.

Expands Marker Line

New Method Steel Stamps, Inc., 149 Jos. Campau, Detroit, offers a greatly expanded line of markers of various types suitable for cutting slots, notches, knurls, serrations, graduation and calibration lines on machinery, ordnance, dials, indexing or calibrating collars or rings, bevelled discs, etc.



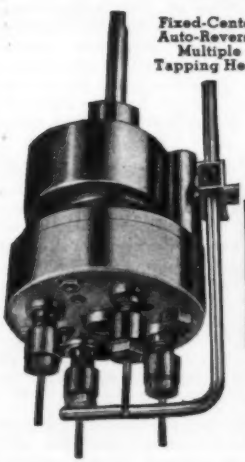
For use where the lines need not be precisely indexed around the circumference or periphery of the parts, markers of the roll type (center and left in the illustration), may be employed in any lathe. Where high production is demanded, they may be mounted in a turret lathe, screw machine or other high-production machine tool. The marking rolls are suitable for graduating or knurling on steel, bronze, brass, aluminum, or any other workable material. It is also possible for the calibration lines to be limited to a portion of the circumference or periphery, the roll marker being equipped with stops that prevent repeating the design or markings even though the lathe or screw machine spindle on which the part is mounted continues to rotate.

These devices are also suitable for use where greater accuracy is required by gearing them to the parts to be

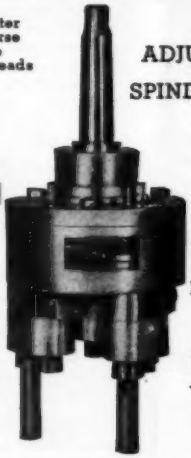
ERRINGTON MECHANICAL LABORATORY

STAPLETON, STATEN ISLAND, N. Y.

MULTIPLE HEADS



Fixed-Center Auto-Reverse Multiple Tapping Heads



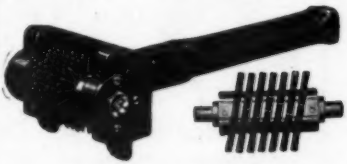
ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

All Parts Fully Enclosed to Insure Pressure Lubrication and Rigid Support of Adjustable Spindles

Super-Sensitive Fixed-Center Multiple Drilling Heads

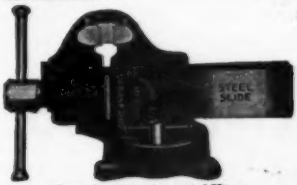
GRINDING WHEEL DRESSERS—VISES

We manufacture the only complete line of Grinding Wheel Dressers and cutters and will gladly suggest the proper one for your wheels.



Desmond Heavy-Duty Dresser

The exclusive solid steel slide makes Simplex Vises stronger and more serviceable.



Simplex Machinists' Vise

Desmond Diamo-Carbo Dresser, best tool room dresser.

Write for catalog H showing complete line of Desmond Dressers and Simplex Vises and name of your nearest dealer.

DESMOND-STEPHAN MFG. CO., URBANA, OHIO

Canadian Desmond-Stephan Mfg. Co., Ltd.—Hamilton, Ont.

marked in such a manner that the calibrations will be precisely located around the circumference. Proper registering devices to suit design of the specific pieces on which the lines or separations are to be cut may readily be obtained. The machines available either with or without corresponding numerals. In some cases the numerals may be added by a separate marker after the calibration lines have been made.

In addition to the more conventional cylindrical types with peripheral indexing lines or calibration, markers are also available with bevelled edges, or may be of disc type for producing serrations on sides of collars, ferrules, etc. Sizes range from micrometer thimbles up to large calibrated hand wheels on machinery. Calibration lines can be varied in length, with any spacing desired. Similarly, the design of serrations, cross hatches, etc., may be varied.

Machine stamps for use in presses (see illustration) may also be obtained with any desired lines or markings.

for Army and Navy Parts

MADISON-KIPP

hi-high pressure

ALUMINUM DIE CASTINGS

We are handling orders for millions of die castings, difficult castings and vital parts for nearly all branches of U. S. defense and U. S. aid efforts. (Many of the parts were originated as die castings at Madison-Kipp). The hi-high pressure casting process completely obsoleted older methods of casting Aluminum. When Aluminum again becomes available for non-defense articles, there will be a swing to this "Lighter — Stronger — Cheaper" metal.

AND

HIGH SPEED

KIPP air TOOLS

Kipp Air Tools give you highest speeds, lowest prices and have proved indispensable in thousands of tool rooms and production departments. Free trial permits any concern with a satisfactory credit rating to try any Kipp Air Tool for ten days. Grinders sell from $9.75 to $58.75. Chippers and Filers at $19.75.

MADISON-KIPP CORP.

207 WAUBESA ST., MADISON, WIS.

600 ROOMS with BATH and RADIO

FROM $3.00

- Ideal Location
- Unlimited Parking
- Radio in Every Room
- Refurnished & Redecorated

HOTEL PHILADELPHIAN

DANIEL CRAWFORD, JR., Manager

A SIGN OF
Hospitality

AMERICAN HOTEL ASSOCIATION
AHA

A SYMBOL OF
Service

FOR A FRESH START
STOP AT A HOTEL

USEFUL FOR THE TOOL ROOM

The Versatile American Tool Holder will hold securely, any size square or round tool bit or boring bar, within its range of capacity. Each holder takes three sizes of bits and holds in four positions. The capacity of the four sizes range from 1/8" in the smallest to 7/16" in the largest.

For further information write for folder.

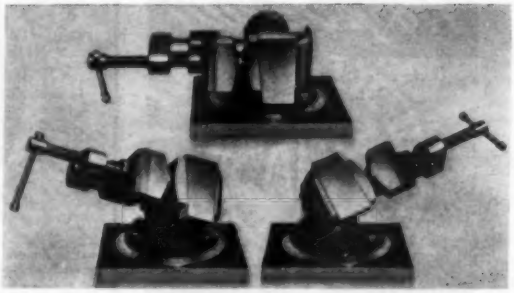
EDWARD BLAKE CO.
555 Old Hampden Ave. New Britain, Conn.

EKLIND UNIVERSAL MILLING HEAD
AND TURCHAN
HYDRAULIC DUPLICATING UNIT

UNIVERSAL HIGH SPEED TOOL CO.
551 W. Washington Blvd., Chicago, Ill.

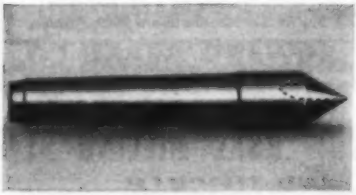
F. & H. Universal Vise

The F. & H. Mfg. Co., 6024 Ellery St., Detroit, Mich., announces a new fully universal vise for use with surface grinders, drill presses and on light mill work.



The vise is readily adjustable to the horizontal, vertical and any intermediate plane, with calibrations for every adjustment.

A full 360° swivel is possible in the horizontal plane with a 90° swivel through the horizontal axis, from the horizontal to a vertical plane, and an additional 180° swivel transverse to the horizontal axis.



The vise is furnished with the usual parallel jaws, together with the Equi-Hold swivel jaws shown which are used in clamping combination angular work pieces. Obviously this vise is adapted for forming tools, chip breakers, and for compound angular work.

A new lathe center is also offered, the construction of which is evident from the illustration. It consists of a standard lathe center having an axial oil groove.

No. 2 Globe Universal Coil Winder

In announcing the high-speed, 10,000 turn counter on it's No. 2 Universal Coil Winder, The Globe Tool & Engineering Co., 432 Davis Ave., Dayton, Ohio stress high production never before considered possible. This feature allows the Winding Machine to operate at maximum speed at which the wire can be fed onto the winding fixture. By using a simple fibre guide block, operator is able to accurately level wire on winding spindle at speeds up to 4000 r. p. m.

The counter subtracts if operator wishes to remove turns, as in the case of an overrun. After a coil is wound,

FLEXIBLE ABRASIVE WHEELS

Designed for precision work where flexibility is required, these wheels are useful accessories for sanding and finishing regular and irregular jobs, penetrating into difficult recesses, lapping holes in dies, finishing various shapes of metal, wood, rubber and plastic parts.

Useful for finishing propellers in aircraft construction. Descriptive bulletin and sample wheel will be sent on request.

FIELD ABRASIVE SPECIALTY MFG. CO.

203 LOWE BLDG., DAYTON, OHIO

STOP WASTEFUL HAND FILING;

Install One Or More Oliver Die Making Machines

and save 50 to 60% of the labor over hand methods. Use less skilled help on many jobs. "A real time and money saver".

You can conserve your High speed cutting tools by regrinding them on Oliver Tool grinding equipment.

Send for literature—no obligation

OLIVER INSTRUMENT CO., 1408 E. Maumee St., Adrian, Michigan

Blade Breakage Stopped Production Insured

BY INSTALLING

PADDOCK Ball Bearing BAND SAW GUIDES

Recommended for New and Old Machines cutting all material at any speed.

SENT ON 10 DAYS' TRIAL

The use of Paddock Ball Bearing Guides increases the efficiency of the machines so that more and better work can be done. The hazard of operation is reduced. Most of the blade breakage is eliminated. Wheels are interchanged—in effect, three sets of guides in one.

Write for details today and list of prominent manufacturers using Paddock Guides.

PADDOCK TOOL COMPANY

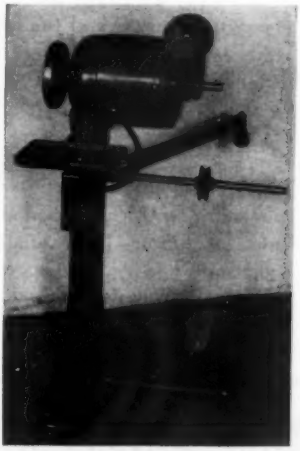
Guide Makers Since 1920

1418 Walnut St., Kansas City, Mo.

Universal
DRILL BUSHINGS ARE SPEEDING UP DEFENSE PRODUCTION
In scores of defense and manufacturing plants Universal drill bushings are doing an outstanding job.
Because of their superfinished bore straight and round within .0001 Universals assure accuracy and unexcelled wearing qualities. All standard sizes available. Write for facts and prices.
UNIVERSAL
Engineering Company
Frankenmuth, Mich.

counter is quickly reset to zero, preparatory to winding next coil.

Even under such speeds, operator is in full control of the winder through a pedal. From the smooth, sensitive operation of this pedal, control of the quick-acting brake, mercury starting



and stopping switch and motor speed control are all synchronized for rapid but smooth acceleration and immediate deceleration. This control feature, especially the variable-speed in infinite steps at uniform acceleration, makes possible the high coil production claimed.

The model for winding from No. 25 to No. 40 copper wire or equivalent has a speed range from 0 to 6000 r.p.m.; while back-geared models are provided at ratios for higher torque required in winding larger wire. These models have speed ranges which are porportionally reduced. Special combination back-gear and direct-drive models are also available. An automatic-stop feature for stopping on a pre-determined number of turns is available on all these models by means of an electrical interruptor operating in connection with a special turn counter.

Bee-Line 125 Ton Hydraulic Press

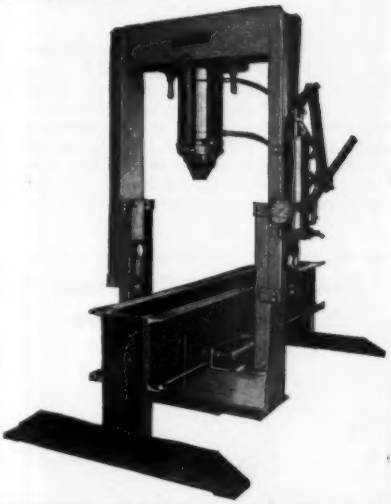
A new 125 ton Bee-Line Industrial Hydraulic Press is announced. It is mounted on a movable roller bearing carriage, which permits the applying of pressure at any point in a 84"x34" area bed.

The jack carriage can be raised or lowered 16" with a minimum space between the ram and bed of 2", and a maximum space of 28". The ram travel is 10".

The jack has a three speed—high, medium and low—pressure pump. Overall dimensions of the complete tool are:—length 8'0", width 4' 8".

The press is most practical for every type of shop including garage, alignment stations, spring service, foundry, aeronautical and railroad maintenance shops, ship building yards, fleet operators.

Address The Bee-Line Co., Davenport, Iowa, for further details.



MAGNI-RAY SPEEDS THE NEW ILLUMINATED MAGNIFIER *UP DEFENSE INSPECTION*

This inspection tool aids accuracy and saves time. Quickly detects burrs and poor finish, blow holes in castings, etc. A vital aid wherever magnification is required to aid the eye. Your purchase order will bring either or both types subject to ten days' approval. ORDER TODAY.

Magni-Ray comes to you ready to plug into the standard 110 volt lighting circuit. May be removed from stand. See lathe hand viewing turning operations. Light shines directly upon work.

Write for folder—OR— Send your trial order. You incur no risk.

Write, wire or telephone CA. 6-1429 for quick deliveries.

TWO MODELS AVAILABLE

Low Power

$16.65

High Power

$24.75

GEO. SCHERR CO., INC.,
122 Lafayette St., New York, N. Y.

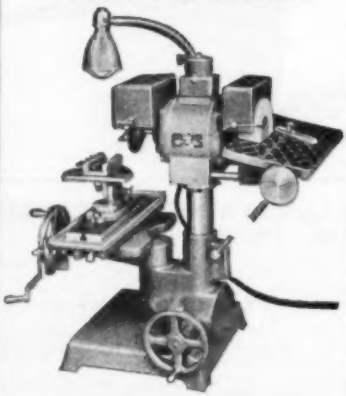
Slant-Box Rack Announced by Stackbin

A new type of rack is announced by the makers of Stackracks. This new rack is designed to store ordinary shop boxes at an angle which effectively converts them into hopper-fronted storage bins and automatically feeds contents toward the front. Slant-Box Racks are individual racks of welded steel construction which interlock to form storage units of almost any desired shape or capacity.

Contents of boxes are always visible and instantly accessible. Tilted runners hold boxes at the proper angle; a wide lip holds them securely in position. The use of standard Stackrack construction permits high stacking in interlocking units which form a storage rack of any desired height, shape or capacity.

Made entirely of heavy angle and channel steel with all joints welded, Slant-Box Racks are described as rigid, permanent, storage facilities which can be changed or added to as conditions demand. They are made in many sizes to fit present boxes. Makers are Stackbin Corp., 55 Troy St., Providence, R. I.

Every *MODERN* Plant *NEEDS* This Machine



Universal Carbide Tool Grinder

If you employ cemented carbide tipped tools in your plant you will want to know that this machine tool performs all the necessary operations for their upkeep. If you don't—well, excuse us for wasting your time and our own.

Bulletin CTG40-12H gives you details.

K. O. Lee Company

Aberdeen, South Dakota, U. S. A.

Booklet on Nylon Bristles

"Industrial Brush Bristles Made of Nylon" is the title of a new 16-page booklet issued by the DuPont Plastics Department.

The booklet gives a short history of nylon, outlines its advantages, reports on its use in the brewery, textile, dry cleaning, dairy, electroplating and other industries, and lists its general physical and chemical properties. A sample of nylon is enclosed in the booklet.

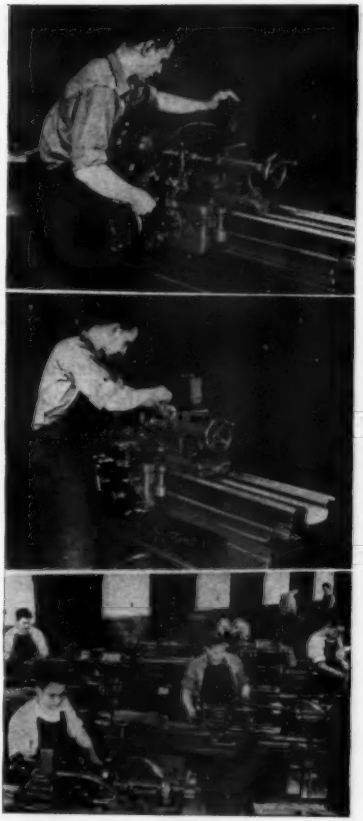
A copy of the booklet will be sent by the Plastics Department of the Du Pont Company at Arlington, N. J., to executives who request it on their letterheads.

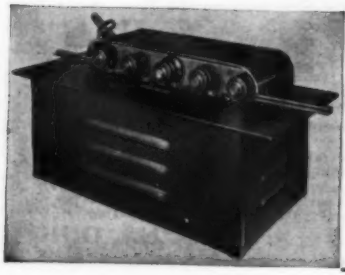
Lathe "Movie" Films

To speed up the training of lathe operators for national defense industries, South Bend has sponsored production of a series of 16 mm. sound motion pictures in full color based on the book "How to Run a Lathe." Professionally filmed by Burton Holmes Films, Inc., at the South Bend Lathe Factory, these pictures show practical shop methods as practiced in modern industrial plants. Showing time for each of the two 800 ft., reels now completed is approximately 20 minutes.

The first reel entitled "The Lathe" clearly shows the apprentice what a lathe is, what a lathe is for, and how the various parts operate. Important lathe operations, including turning, facing and thread cutting, are demonstrated. The second reel, "Plain Turning," shows in detail each operation performed in the machining of a straight cylindrical shaft between lathe centers. Close-ups show locating and drilling of center holes, adjustment and setting of cutting tools, use of quick change gear box, changing speeds, and operation of the lathe carriage and apron.

Factory apprentice schools, vocational schools, Army and Navy training schools, colleges and high schools teaching machine shop practice will find these films helpful in training lathe operators. Complete information on obtaining the use of these films can be had by writing to South Bend Lathe Works, Dept. M6, South Bend, Ind.





MAPLEWOOD "PORTABLE"

for rolling light gauge materials.

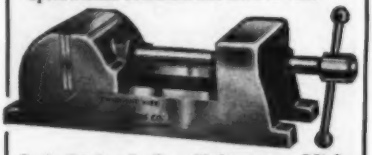
Interchangeable rolls for Pittsburgh lock, acme lock, drive cleat, right angle bend, channel or special shapes.

Write for catalogue on pipe, elbow and rolling equipment.

MAPLEWOOD MACHINERY CO.

2634 Fullerton Ave., Chicago, Ill.

DOUBLE YOUR DRILL PRESS CAPACITY
Minutes are Seconds with the new TWISTITE Vise.
Opens to full capacity in one second.
Speed Defense Production with this New Vise.



J. A. Richards Co., Kalamazoo, Mich.

ARMGLO

Manufacturers of Resistance Welders—Foot, Motor, Air and Hydraulic operated.

•

Standard and for specific applications with and without electric timing control.

•

Bench type filing and sawing machines and abrasive band finishing machines.

•

ARMGLO COMPANY
Milwaukee, Wisconsin

Despatch Oven Bulletin

The new Despatch bulletin No. 81 describes and illustrates in detail the outstanding advantages of Despatch furnaces. It is interesting to note the many standard sizes of these furnaces. Special sizes arranged for maximum temperatures of 1250 degrees F. may also be provided to meet individual requirements.

The company has tried to make this bulletin as interesting and informative as possible and believes that it contains a great deal of helpful information on the selection of modern, high-speed furnace equipment.

Copies may be obtained from Despatch Oven Co., Minneapolis, Minn.

Booklet on Metallizing

The history, purpose, and practice of metallizing (metal spraying) are discussed in a booklet announced by Metallizing Co. of America, Inc., 562 W. Washington Blvd., Chicago, Ill.

The company points out that present defense demands for metal conservation as well as the shortage in machine tools and skilled labor have placed new emphasis on the metallizing process. This informative 52-page brochure is intended to answer the flood of questions arising from this newly stimulated interest.

The equipment necessary, zinc applications, metallizing turbine runners, saving worn or incorrectly machined parts, and machine shop service to the customer are a few of the subjects covered in this interesting booklet.

GOOD NEWS!
for DIE MAKERS

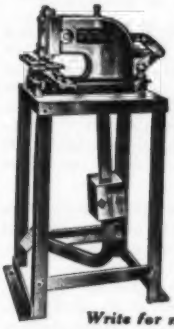
Transfer Points Eliminate Guesswork in Die Making

There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in ¼" to 1" diameters.

3/16" ..... $1.50 per set 5/16" ..... $1.25 per set 7/16" ..... $1.40 per set
1/4" ..... 1.20 " " 3/8" ..... 1.35 " " 1/2" ..... 1.50 " "

HEIMANN MFG. CO., URBANA, OHIO

BUY WHITNEY-JENSEN
METAL-WORKING MACHINERY and HAND TOOLS
for LONG LIFE and ACCURACY



SAVE MONEY WITH THESE FOOT PRESSES

Low-cost, toggle-action machines, adaptable to many light production and jobbing operations requiring punching or forming. Capacity, 2" hole in 16 ga. iron, 100 holes per minute or better. Four sizes, 7", 10", 18", and 24" throat depth.

Write for new Catalog No. 14.

WHITNEY METAL TOOL COMPANY
115 FORBES STREET • ROCKFORD, ILLINOIS

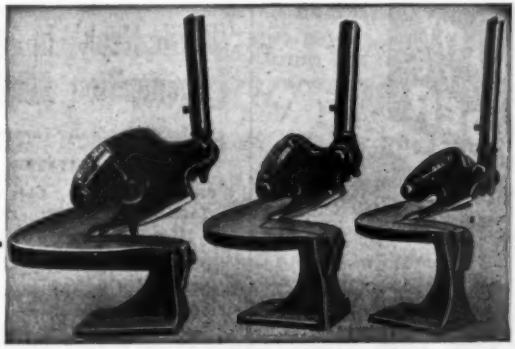
NEW TAYLOR "Hi-Duty" Drilling Machine

NEW Taylor "HI-DUTY" Moderately Priced. Model F-400 Production Drilling Machine Capacity 1/32" to 1/2"

Many Outstanding Features
Investigate To-Day!

TAYLOR MANUFACTURING COMPANY
3056 West Meinecke Ave. Milwaukee, Wisconsin

SPEEDS UP THE JOB



CUTS METAL ANY SHAPE

BEVERLY Throatless SHEAR . . . Ideal Bench Type!

Just the thing to speed-up those vital Defense Orders! Cuts metal any shape with hair-line accuracy! No distortion! Precision workmanship and finest steel make BEVERLY last a lifetime! Investigate these efficient bench-type shears, today!

Made in 3 Sizes

No. 1 — cuts 14 gauge — wt. 16½ lbs.
No. 2 — cuts 10 gauge — wt. 33 lbs.
No. 3 — (Equipped with ball bearing hold-down device) cuts 3/16 inch mild steel or 10 gauge stainless — wt. 55 lbs.

BEVERLY SHEAR CO., 3005 W. 110th PLACE CHICAGO, ILLINOIS

KEMIFILM

NEW Transparent, Quick Drying, Hard, Durable Coating

Offers exceptional possibilities for solving many problems where durable protective coatings are required. Tests are suggested for replacing metallic coatings, slow drying finishes and rust proofing processes requiring much time and equipment.

•

ALSO PROTEX NON-RUST OILS AND PRODUCTION LUBRICANTS

Wayne
CHEMICAL PRODUCTS CO.
9446 COPELAND AVE. DETROIT, MICHIGAN

New "High Vision" Fluorescent Luminaire

To speed up production in industrial plants, where extended light lines are desirable, a new Westinghouse 40-watt fluorescent luminaire is announced.

Known as type FPS-40, the luminaire uses 2 or 3 40-watt fluorescent lamps per reflector and will provide lighting intensities of from 30 to 100 footcandles with maximum diffusion, minimum glare and uniform distribution at ordinary spacing and mounting heights. It provides adequate visibility for close precision work.

Design of luminaire makes it possible to construct any length of strip desired from four simple and compact types. Channels provide a continuous wireway which may be mounted on conduit, messenger cable, twin-rod suspension or directly on the ceiling. All auxiliary equipment is mounted in the channel. The units have twin-ballasts with built-in compensators providing power factor of 90 per cent or over.

DESIGNED for real production work and the toughest jobs. A powerful, high-speed tool, widely used and recommended.—A worthy companion to our famous "SUPER SPEED" MODEL S.S.—S.R. Precision made, streamlined, excellent balance. Special grease-sealed bearings—no lubrication required.

Also Other Models and Air Line Filters and Automatic Air Line Lubricators.

A FAST-CUTTING STURDY TOOL

•

Write for Circular and Details of FREE TRIAL OFFER

M-B PRODUCTS • EXPORT OFFICE 60 WHITEHALL ST. New York N.Y. U.S.A.

"Bottle Neck" In Threading Ammunition Eliminated

A New Automatic Thread Miller

FACILITATES

Fool-Proof Cutting Left and Right
Internal and External Threads
Up to 7" Outside Diameter
5 to 20 Threads Per Inch

Irregardless of Thread System including Metric. Inspection Rejects Eliminated.

Combining Accuracy, Ease of Operation, Economy, Interchangeability of Parts, Precision, Simplicity With Low Price and

SPEEDY DELIVERY.

Agents with proven following wanted in various states of the U.S.A.

U. S. MACHINE TOOL MFG. CORP.
100 So. 6th St. Terre Haute, Indiana

SAVE TIME-MONEY ON THE

LINLEY High Speed Vertical Milling Machine and Jig Borer

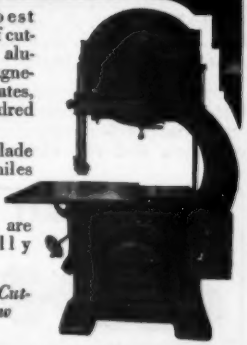
Get all the details of this machine-equipped with micrometer-screw feed quill - direct reading—assures smooth boring accurately to any predetermined depth up to 3".

Write for descriptive bulletin.

LINLEY BROTHERS COMPANY

11 Montauk St., Bridgeport, Conn.

TANNEWITZ *High Speed* METAL CUTTING BAND SAWS



Fastest and best known means of cutting sheet steel aluminum and magnesium sprues, gates, risers, and kindred items.

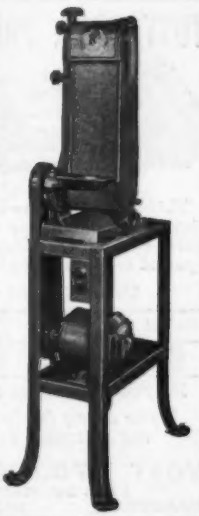
Provides sawblade travel of over 2-miles per minute with PERFECT SAFETY. Cuts are exceptionally smooth.

Write for Metal Cutting Band Saw Bulletin.

THE TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN

Made for *PRODUCTION* —— by *PRODUCTION*

No. 608 Abrasive Belt Surfacer



It saves time burring, surfacing and polishing plastic moulded products, rubber, wood, pressed steel parts, die castings, iron, steel, etc.

Adjustable from vertical to horizontal position within a few seconds. Ball bearing equipped throughout.

Work or belt table is 15"x6". Abrasive belt is 50" long x 6" wide. Work gauge is adjustable to any angle and removable. Other sizes 4" to 20" width of belt. Vertical and Horizontal. Also Reed High Speed Sensitive Drills and Greenfield Universal Tool and Cutter Grinders.

PRODUCTION MACHINE CO.
GREENFIELD, MASSACHUSETTS

Anchor Type Elastic Stop Nuts

Following successful use of their anchor type nuts in aircraft construction, Elastic Stop Nut Corp., 2325 Vauxhall Road, Union, N. J., now offers these nuts for blind-mounting applications on general industrial equipment.

Designed to provide vibration-proof fastenings for removable plates used to cover hand holes, access and inspection openings, and for other blind mount attachments, anchor nuts are permanently riveted to inside of the structure. The bolts, which are inserted from the outside, pass first through the removable plate, thence through structure into the stationary nuts.

The nuts are offered in a wide range of sizes, materials, and thread systems, every nut incorporating the basic Elastic Stop self-locking feature, a fiber locking collar which is an integral part of each nut. This locking fiber is designed to prevent bolt from becoming loose after it is installed in nut, regardless of the severity of vibration to which it is subjected. In such mountings, bolts may be removed and replaced many times, the anchor nuts retaining their locking ability because of the resilient character of the fiber collar. It is pointed out too that the fiber of the collar, being softer than the metal of the screw, cannot damage the threads or their plated surfaces.

As with other Elastic Stop Nuts, when end of the bolt enters the unthreaded collar, its passage is resisted, thus immediately and automatically eliminating play between the threads of bolt and nut, and establishing contact of the load-carrying threads under pressure. Further turning and tightening of bolt impresses a thread in the fiber collar, creating a moisture-tight seal around bolt and maintaining the thread contact with a resilient grip.

A further explanation of the Elastic Stop self-locking principle, and a complete listing of the anchor nuts, are contained in a fully illustrated catalog.

TROYKE ROTARY TABLES

Moderately Priced

Made in 9", 12", 15", 18", 21", 25".
With or without dividing attachment.
Ask your dealer or write us for complete 8 page catalog.

ALFRED A. TROYKE
4422 Appleton St., Oakley, Cincinnati, Ohio

YOST DRILL PRESS VISE

This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

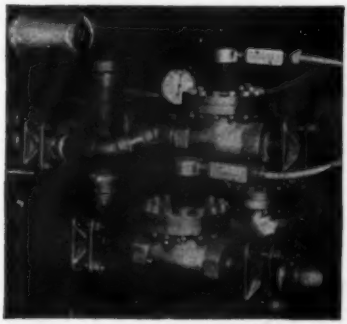
Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY
1335 SO. MAIN ST.
MEADVILLE, PENNSYLVANIA

Atkomatic High Pressure Valves

The standard line of Atkomatic Valves, for operating pressures up to 300 lbs., pressure, has been recently supplemented with a line of High Pressure Valves, for operating pressures up to 3,000 lbs.

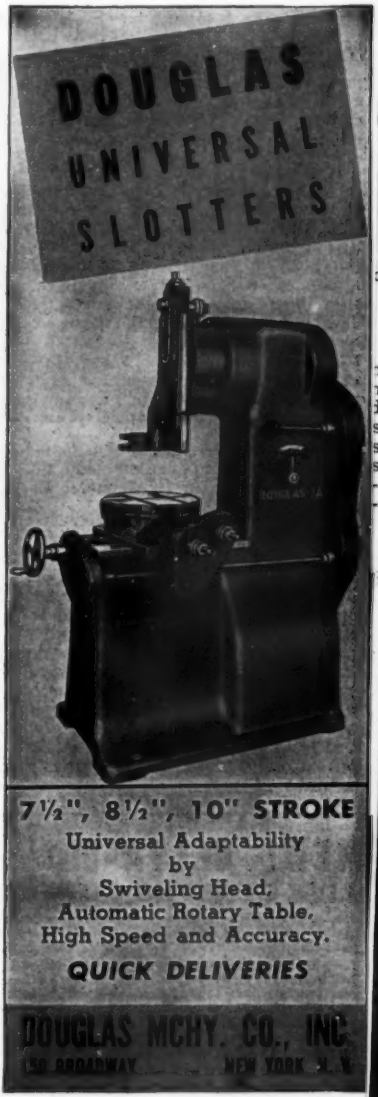


These valves are made in ½", ¾" and 1½" sizes and can be furnished for standard currents.

Under some conditions, when used on liquids, a certain amount of timing control may be obtained on opening and closing speeds.

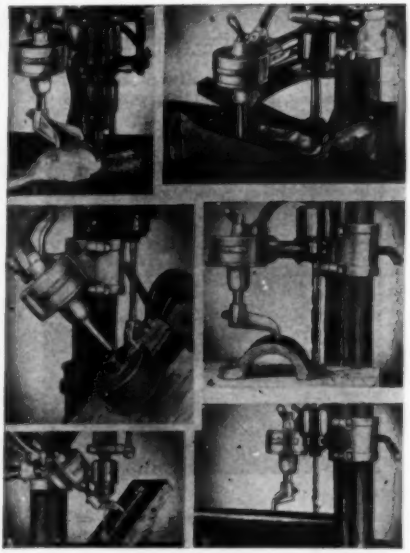
The illustration shows the valves operating a 250-ton press at 1,000 lbs., oil pressure, with full remote control. When press hits full load, pressure immediately goes to original accumulator pressure with no time lag, due to special automatic arrangement.

The valves are of bronze, packless, with renewable seats and discs and are exceptionally rugged. Screwed ends are provided. Seat diameters can be furnished up to full pipe size. Bubble-tight pilot assembly can be furnished for air and gas operation. Advise full operating data and seat area desired. Address E. C. Atkins and Company, 485 So. Illinois St., Indianapolis, Ind., for full information.



Mead Air-Clamp

A new type hold-down for drill press work is said to speed up drilling operations materially, reducing and sometimes actually eliminating jig and fixture costs.



It is adapted for use on any drill press having a cylindrical column. It is quickly attached by means of a divided collar which clamps in any desired position. The working head is mounted on a heavy, horizontal arm which slides in a split boss on the column collar. Two hand levers hold the head in any desired position so that pressure may be applied in any direction and at any point on the work, regardless of size or shape, within capacity of the drill press.

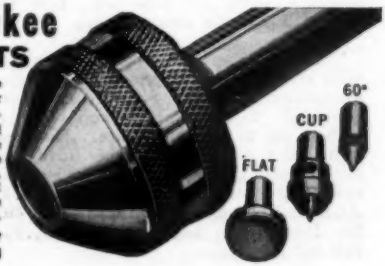
Operation is by means of a two-way valve on upper left side of working-head. A foot-control is also available.

Quick, detachable hold-down feet of various designs, can be used according to shape of the work, or the ram alone may often be used on large units. When pressure is released, the arm automatically returns to the "top" position, giving ample clearance for work removal.

The model shown is designed for use with a line pressure of 40 to 80 pounds, and is intended for drill presses up to ¾" capacity. Collars to fit drill press columns of various diameters can be furnished. The standard model (shown) has a "reach" of about 14" from column, so the pressure-foot may be brought down behind, on either side of, or practically in front of the chuck. The ram is rotatable in cylinder so pressure-foot may swing a full 360°.

Manufacturers are Mead Specialties Co., 15 So. Market St., Chicago, Ill.

NEW! DELTA-Milwaukee
LIVE CENTERS CUT COSTS



Just as other Delta Machines have outmoded older, more cumbersome units, so have Delta Live Centers replaced other more costly live centers . . . . saving dollars in many a plant.

Long life because of a double row of Double-seal Pre-loaded Ball Bearings lubricated for life. Perfect accuracy because the center socket is drilled and machined after assembly. Multiple uses on the Lathe, Grinder, Screw Machine, Gear Hobber, etc., because it has three interchangeable centers and a No. 2 Morse Taper Shank. And a host of other features give you more for your money. Write today for facts on the Delta Live Center.

The Delta Manufacturing Company
600 E. VIENNA AVENUE MILWAUKEE, WISCONSIN

A New All Purpose Mitering Attachment

Ripping, cutting off and mitering operations are facilitated with a new Doall Mitering Attachment developed by Continental Machines, Inc., Minneapolis, Minn. These three operations are performed on a single unit adapted to either manual or power feeds. Quickly mounted on the work table, no time is lost in applying pressure directly in line with saw cut. Rods, tubing, bars, gates, channels, rails and irregular shapes can be notched, squared, ripped and mitered without excessive setting up delays.

Attached to the front instead of the side of the work table, on a sectional guide for full table coverage, the mitering attachment does not interfere with removal of filler plate.

The Mitering Head is attached to slide rods and carried by the slide rod bracket mounted on the above guide. A removable guard gives protection against sawing into the mitering head.

Manual operation is accomplished by a 6" hand wheel through a screw which engages an internally threaded tube on the slide rod bracket, for feeding Mitering Head directly toward the saw.

Power feeding merely requires the disengaging of the internally threaded tube.

The mitering attachment gives full sawing capacity for complete table coverage, with adjustable stops for limiting the stroke to any desired amount.

SOLID OAK OR POPLAR GS MACHINISTS TOOLCHESTS

Also leatherette-complete line. The right type of chest for for every mechanic from higher grade to more reasonably priced.

BEFORE ORDERING ANY TOOLCHEST, write for our literature.

Geo. Scherr Co.
122 Lafayette St.
New York, N. Y.

MADE OF ALLOY STEEL MILLED FROM BAR

SOCKET HEAD CAP SCREWS

SAFETY HOLLOW SET SCREWS

Try Them On Your Next Job!

ECONOMY MACHINE PRODUCTS COMPANY

5207 Lawrence Ave., Chicago, Ill.

"DIE ACCURACY without DIES"

That's exactly what you get with "DI-ACRO" Precision Machines—Bander, Brake, Shear. They make many small parts and save time and die costs. The

"DI-ACRO" BRAKE

quickly creates non-stock sized angles, channels, "Vees", etc. Accurate to .001". Folding widths 6", 12". Right or left hand operation.

Write for literature.

O'NEIL-IRWIN MFG. CO.

314 - 8th Ave., So.,
Minneapolis, Minn.

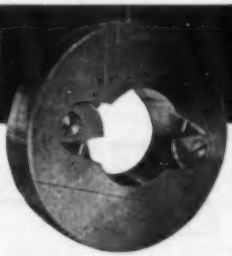
Stamp Holder Features Wedge Lock

Incorporating a new "shock-proof" feature, a newly designed interchangeable hand stamp holder is now offered

by New Method Steel Stamps, Inc., 145 Jos. Campau, Detroit. The new holder has a special wedge lock which prevents individual hand stamps from loosening after continued use of the holder.

The wedge lock holds the stamps both sidewise and endwise against movement. Instead of using several set-screws at sides and ends, as is usual in holders of this type, a single set-screw is used at the end to retain all the stamps in position. The stamps may be locked and unlocked quickly by the single set-screw, which is of the socket type, using a wrench of hexagonal style. The body of the holder is large and substantial. The shank is knurled, and is also unusually sturdy, with end hardened and tempered to prevent chipping or mushrooming under repeated hammer blows.

Primarily designed for use where several numerals or letters must be used to designate the part marked, yet may be changed frequently, the use of interchangeable stamps permits frequent changing, and also replacement where numerals or letters become worn, thus reducing replacement cost. The holders are made to accommodate any number of characters and all sizes of stamps. They are also available with shanks to fit presses, etc.

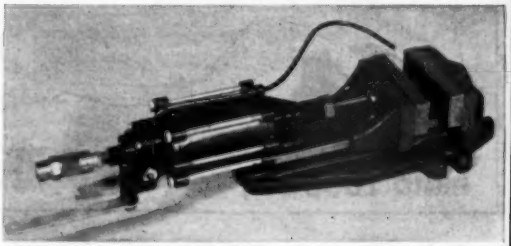


for your lathes **SENECA FALLS** *Automatic* **WORK DRIVER**

Self Centering . . . Quick Acting . . . No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Falls St., Seneca Falls, N. Y.

The New Cardinal Automatic Air Vise



This newly developed Air Vise is described as a new tool designed especially for shops working on large quantities of small parts. For countless drilling, tapping, and milling operations this vise is claimed to give semi-automatic convenience to a standard small drill press or milling machine. The operator's function is reduced to merely operating the spindle or table feed controls and placing work pieces in the vise. Clamping and opening of the vise are automatic, as are also the cleaning of the vise and ejection of the finished pieces.

The illustration shows arrangement of the vise and its various parts. The thick jaw faces are machined to fit the particular part to be handled, and the exhaust air tube is bent into position to blow into this cavity when vise is opened. Exhaust air ejects the finished part and completely clears the cavity of chips leaving it ready to take the next piece. The stop nut on the plunger rod limits travel of the vise jaw to the required amount.

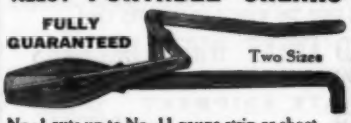
Automatic operation is accomplished merely by connecting the valve control lever with chain or cable to some point on the drill press spindle or milling machine column, the length of this connector being adjusted to open valve at the proper point in the travel of the spindle or the table. These installations are simple to make and the valve control lever can be operated from almost any direction.

Many aircraft parts manufacturing plants report that time on some operations has been reduced as much as 50%. Makers are Cardinal Machine Co., Glendale, Calif.

ALL ALLOY **PORTABLE SHEARS**

FULLY GUARANTEED

Two Sizes



No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to ¼" steel plate.

Special Blades for shearing stainless steel.

BREMIL MFG. CO.

1720 Pittsburgh Ave., Erie, Pa.

Hartford Bench Taper Gage

This gage has been developed to not only meet tool-room requirements, but manufacturing requirements.

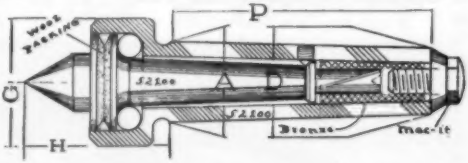
It is made in a most substantial manner of the best materials. The gage plates are hardened and ground. In operation the gage sets on a bench convenient to the workman. It is adjusted to the height of his eyes, and placed so that he looks toward the light through the gage. The gage plates are set to a master plug gage. It is found much more accurate and rapid to operate than a ring gage.

Height to center line of gage: greatest, 30¼ in.; least, 23¼ in.; weight, 23 lbs.

Capacity—From nothing to No. 14 Brown & Sharpe taper.

Built and sold by

The Hartford Special Machinery Co.
HARTFORD, CONN.



No. 52100 Steel, Gold Seal Balls, Mirror-Finish bearings, Mac-it Screws, Integral Ball-Races, Gracefully tapering Spindle, Bronze Bushing, Minimum Parts, Repeat Orders & 100% Collections, are the characteristics that go with the Rigid Live Centers.

RIGID TOOL CO., 2000 Witherell St., Detroit, Michigan

Tulca "Supervisor" Safety Spectacles

The Tulca Division of the Univis Lens Co., Dayton, Ohio, has added a new, rimless-type, safety spectacle to its eye protection line. The "Supervisor" spectacle is fitted with the company's special material (not glass) Tulca Safety Lenses. They come with or without side shields.

According to the manufacturer, these safety spectacles are as comfortable and as pleasing in appearance as reguler eyeglases because of the extremely light weight of the Tulca Lenses. They were designed specifically for use by supervisors, checkers, inspectors, maintenance men, and by visitors who are exposed to eye hazards in plants, even though they are not actively engaged in operations where the wearing of goggles is mandatory.

One of the most important safety features of these Tulca Lenses is the fact that they do not pit.

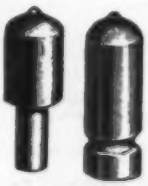
In addition to the Tulca "Supervisor" Safety Spectacles, the company also manufactures Tulca Safety Lenses for special types and sizes of safety goggles, as well as the Tulca GM No. 1 Safety Goggle.

Ampco Issues New Bulletins

Ampco Metal, Inc., Milwaukee are distributing two new bulletins covering "Ampco Metal in Aircraft" and "Ampco Metal in Acid Resistant Service." These are letterhead size, six pages, and well illustrated.

The former discusses the growing use of aluminum bronze by the aviation industry, contains a diagram of a typical plane indicating the numerous parts made of Ampco Metal, and gives a comprehensive table of aircraft specifications met by Ampco-made bronzes.

The latter describes the ability of Ampco Metal to resist acid and corrosion, and shows the importance of Ampco-made bronzes in this field. The bulletin is well-illustrated with views of parts used in acid-resistant service.



FOR DEFENSE

KARELSEN'S DIAMONDS KEEP THE WHEELS OF INDUSTRY TRUE

DIAMOND POINTED EMERY WHEEL DRESSERS

¼ KT. TO 10 KT.

IMMEDIATE SHIPMENT

Send for Prices *Specify Holder*

"If its made of Diamond—Ask us First."

E. KARELSEN, INC. *Established 1852* 56 W. 45th St., New York, N. Y. Tel. VAN. 6-5688

O'Neil-Irwin Adopts Trade Name "Di-Acro"

The O'Neil-Irwin Mfg. Co., 314 8th Avenue S., Minneapolis, Minn. has adopted the trade name "Di-Acro" for their products which up to this time have been known as the Micro Bender, Micro Brake, and Micro Shear. The manufacturer feels "Di-Acro" is a more distinctive name and together with the descriptive phase "Die Accuracy without Dies" more closely identifies the products.

The latest model of "Di-Acro" Brake No. 2 is announced. It has a capacity of 12" and weighs 110 lbs. with a very heavy cast base which assures rigidity of the whole machine, accuracy of adjustments, as well as a permanent accuracy of .001" in production work.

As a further precaution for maintained accuracy, bearings are adjustable for wear and alignment, take up for wear being provided by laminated shims of .002" thickness.

The folding plate is easily removed when alterations are needed for working materials with interfering planes.

No fingers are required for making parts for boxes within the capacity range of the "Di-Acro" Brake.

Weight distribution in various parts of the machine has been designed for balance of moving parts so that on production work a minimum of effort will be required by the operator. The folding process is fully visible to the operator at all times which makes for speed and accuracy.

Roan Tool Grinder Bulletin

The Roan Mfg. Co., 1220 Washington Ave., Racine, Wis. offers a new bulletin describing its new universal Tool and Cutter Grinder. The grinder features a combination of fixtures which enables users to grind and sharpen all types of metal working tools, as well as handling contour and surface grinding within its range.

JFS — CUB

VARIABLE SPEED TRANSMISSION

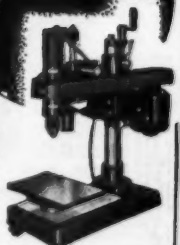
For "A" section V-belts—3.3—1 speed range—perfect belt alignment in all positions. Priced so low that no shop or machine need go without infinite speed selection. Send for data today. $16.50

STANDARD TRANSMISSION EQUIPMENT COMPANY

Dept. HC. 416 W. 8th St. Los Angeles, Calif.

THE SMALLER THE HOLE THE MORE SENSITIVE THE DRILLING

The HAMILTON MUEHLMATT Super Sensitive DRILLING MACHINE



for utmost precision extreme sensitivity practical economy

A "must" where precision sensitivity and extraordinary accuracy are the difference between "Okeh" or "n. g."

For small hole drilling in instrument, aircraft, Diesel or other operations.

A word from you brings full information . . . at once.

THE HAMILTON TOOL CO.

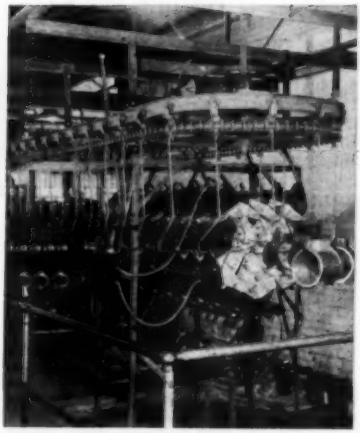
Ninth and Hanover Streets,

HAMILTON OHIO

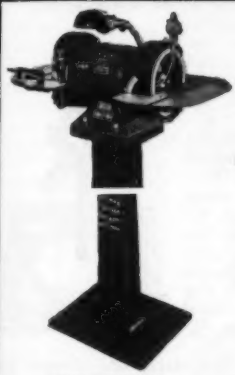
Rejects Reduced by Shrinkage Fit

To reduce rejects frequent in press fitting of aluminum and steel parts, infra-red heating is now being used at the Westinghouse small motor plant, Lima, Ohio. Aluminum frames are heated to 150° C., which expands the 6¾" bore .020", enough to allow the wound primary to drop in place.

When press fits are reduced to the point where scoring or "galling" does not result, the hazard of loose fitting parts is greatly increased, which invariably means heavy scrap losses. Using the infra-red heating method as suggested by Fred C. Gossett, supervisor of methods, tools, and equipment at Lima, the shrink fit allowance is much larger than that practical for a press fit. A rotary conveyor traveling at the rate of 30 feet per minute carries aluminum small motor frames through a tunnel formed by a battery of 56-375-watt lamps. Until this method was discovered, the mechanical operation of obtaining proper fits between hard and soft metal parts had always been more or less unsatisfactory.



New Britain
UNIVERSAL VISE
Swivels 360 degrees horizontally, 100 degrees vertically, to give any angle or compound of angles.
Write for Further Information.
NEW BRITAIN TOOL & MFG. CO.
NEW BRITAIN, CONN., U. S. A.



PROMPT DELIVERIES CAN STILL BE MADE

Prosser

CARBIDE TOOL GRINDER

Removes metal fast when rough grinding.

Finish grinds smooth, keen cutting edges.

Oversize 7" wheels give greatly increased wheel life.

This grinder will quickly pay for itself by increased tool performance and life between grinds.

MODEL AA

Write for details of free trial offer

THOMAS PROSSER & SON

120 WALL STREET NEW YORK

Sheet and Strip Weight Calculator Announced

Dayton Rogers Mfg. Co., 2930 - 13th Ave., South, Minneapolis, Minn., announces a revised and improved sheet and strip weight calculator. This handy "pocket slide rule" will show the correct weight of any sheet or strip stock relative to the piece part weight.

Although designed primarily for use with steel, there is a conversion table for such materials as aluminum, cast iron, lead, etc. This calculator may be used for sheets ranging from ⅛ to 96" in width, from .002 to 1" or more in thickness, and from 1" to 1000 ft. in length.

The Dayton Rogers Sheet and Strip Calculator is of handy pocket size, 3½ by 4". It should prove helpful for executives in punch press and other related departments.

"Balanced Lighting"

An attractive brochure on balanced lighting is announced by Fostoria Pressed Steel Corp., Fostoria, Ohio. It is lavishly illustrated with photographs of specific applications of lighting. It is emphasized that balanced, effective lighting requires both general and local lighting sources.

The GLENNY
Adjustable-Expansion
BROACH

Produces low cost, accurate keyways. Eliminates set-up time. Self aligning. Interchangeable parts. Adapted for arbor press, mechanical or hydraulic pressure. Speeds up production. Cutter bars in carbon or high speed steel. *Details? Write!*

EAST SHORE MACHINE PRODUCTS CO.
833 E. 140th St., Cleveland, O.

BAUMBACH

STANDARDIZED
Machined Steel **DIE SETS** Semi-Steel

Drop Forged Steel

Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalog.

E. A. BAUMBACH MFG. CO.
1810 So. Kilbourne Ave., CHICAGO, ILL.

D & D Hole Cutter

An adjustable hole cutter for any material (wood or metal) is offered by Woodworkers Tool Works, 220 S. Jefferson St., Chicago, Ill.

The No. 1 Junior size has a ½" shank and is intended for light work only. It can be used with any electric or hand drill for holes ¾" to 2½".

The No. 2 Standard size shown has a ½" shank and drills holes from ¾" to 3". No. 3 covers the range from 1" to 3½". No. 4 has a ⅝" shank and covers the range from 3½" to 6". The No. 5 Jumbo size has a No. 3 Morse taper shank and handles a range of from 6" to 12". Special shafts can be supplied without extra charge. Extra pilot drills and bits are available.

Cincinnati Planer Booklet

A general illustrated booklet (Bulletin No. 151) is offered by the Cincinnati Planer Co., Cincinnati, O. A picture is included of each type of machine offered. The company's line includes open side planers, double housing planers, planer type millers, and vertical boring mills. Further individual bulletins with illustrations and complete technical information are also available on any machine.

Why Not Buy The Original Electric Etcher?

MARK IRON AND STEEL
THE ETCHOGRAPH WAY

New ELKONITE TIP pencil.
New Baby Grand Model at a lower price.

2,000 in use

BREWSTER - SQUIRES CO.
42 Church St., **New York, N. Y.**

Bearings

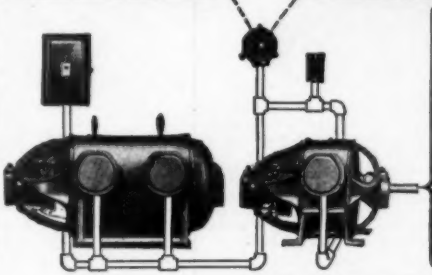
A most unusual development in automobile building practice is occurring. This consists of an entirely new method of finishing crankpins, main bearing journals, and other steel surfaces where there is lubricated metal - to - metal contact. It is claimed that the new method results in longer bearing life and the ability of bearings to withstand greater loads. Tests in the experimental laboratories and on the road have been made.

According to the engineers associated with the new development, finishes of crankpins in the past, as measured by a precision surface measuring instrument, have an average depth of surface scratches or depressions of 4 to 5 micro-inches (millionths of an inch). In some cases, the finish has been even closer. The new practice calls for a "rough" finish of from 40 to 70 micro-inches; this finish, it is stated has produced a substantial reduction in bearing wear and bearing failures.

In the present research, four of the eight connecting-rod journals on a test shaft were ground with deeper grooves or scratches than the usual ground finish. The other four had the standard production finish. After an endurance run it was discovered that the rod bearings on the "rough" journals were in much better condition than those on the small journals. This was checked by varying the position of the "rough" journals on other shafts, the same results being obtained in every test.

The theory of the improvement in bearing life shown by actual tests is that lubrication is improved, and, consequently, operating temperatures are substantially reduced.

10-TO-1 SPEED RANGE FROM A-C POWER



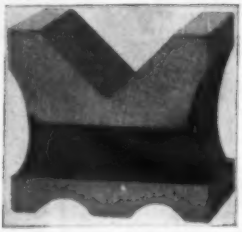
1 TO 15 HP DRIVE FOR LATHES . . . MILLS . . . . CONVEYORS PUMPS - FANS STOKERS . . *and other adjustable speed applications*

Here's the new, low-cost way to get adjustable speed, constant torque drive from a-c power. The Westinghouse Adjustable Speed A-C Drive provides instant speed adjustment from 175 rpm to 1,750 rpm for continuous operation—slower speeds for starting or setup. No exciters, clutches or complicated control. Push button starts or stops the drive—a single rheostat controls the speed. Nothing else to buy. Write for bulletin DD-4063. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Dept. 7-N. J-21171

Westinghouse

A-C ADJUSTABLE-SPEED DRIVE

"TRU-V" BLOCKS



Why Not Save Time—by having enough V-Blocks available at all times in your shop to avoid the delays involved in make-shift set-ups and tie-ups?

"TRU-V" Cast-Iron Blocks are available in nine sizes—from 3½ to 10", in three styles. Each block is carefully machined on all sides, with close limits held within .001" where required. A machined ledge on both sides provides for clamping on machine bed.

Let us send descriptive bulletin.
Or contact your mill supply dealer.

Oliver Motorcraft Corp.
2532 S. Wabash Ave., Chicago, Ill.

"JOHN'S" DRILL JIGS

Screw Products Plants—
ATTENTION—

These Jigs are now supplied with Universal jaws which permit quick set-up for end drilling and tapping.

The reversible "V" plates accommodate diameters from ⅛" to ¾" on the 6" Jigs; and ¼" to 1" on the 8" Jigs.

HEUSER MFG. CO.
1638 N. Paulina St., Chicago, Ill.

New Rapid Slide Tool

A new rapid slide tool for turret lathes has recently been announced by Gisholt. It is designed to hold small boring bars and forged cutters.

Movement of the lever transmits a rapid, smooth motion to the slide permitting back - spacing and recessing operations to be performed quickly. Adjustable stops are provided for quick setting, permitting duplicate work.

Additional information on this new tool is available from Gisholt Machine Co., 1185 East Washington Ave., Madison, Wis. Specify size of lathe on which it is to be used when writing.

Manual on Near-Infra Red

A new manual on the Near Infra-red Process, covering applications in the industrial, printing and motor-baking fields, is offered by The Fostoria Pressed Steel Corp., Fostoria, Ohio, and is available to all persons who request it on their company stationery. Ask for PS-29.

This 16-page presentation is illustrated with pictures of various applications and equipment to operate the process and describes radiant energy in detail and how it works.

At least 100 large companies working on Defense Production today are using Fostoria Equipment to speed Baking, Drying, Preheating and Dehydrating problems in their plants.

In this manual are given the reasons many Defense manufacturers have turned to the Near Infra-red Process to solve "bottlenecks" in their manufacturing problems.

Sub-Contracts

Defense Production Clinics are being held by OPM in an effort to help spread defense work among all small manufacturers who are qualified.

Nine such clinics have already been held in large industrial centers. The ninth clinic was held in Chicago at the Stevens Hotel on October 22-24 and was declared by OPM officials one of the most successful in their experience.

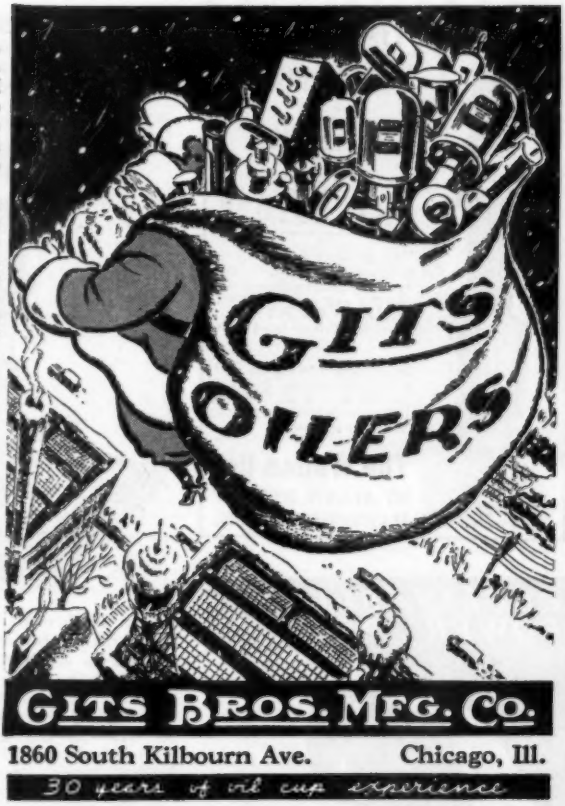
Purpose of a clinic is to facilitate contact between firms holding prime defense contracts and potential subcontractors. At Chicago 170 booths were manned by representatives of prime contractors. Five thousand manufacturers came in person or sent executives to study the blueprints and sample parts on display.

Many of the parts shown were already contracted for; main purpose of a clinic is to help prime contractors to discover small plants equipped with the type of facilities they could use now or will need for future requirements. Similarly, a clinic enables small manufacturers to find out which prime contractors are most likely to need their services in future. In addition to direct contacts, such a meeting has great educational and inspirational value.

Success of the Chicago clinic is attested by the fact that contractors reported a gratifying percentage of those interviewed were qualified for subcontracts. One prime contractor found exactly what he wanted; previously he had traveled from coast to coast searching for such facilities. Many Eastern manufacturers were surprised at the number and variety of facilities in the Midwest.

Chicago branch of OPM intends to set up a permanent exhibit of defense items to aid potential sub-contractors.

Number of firms registering their facilities with Chicago OPM was increased 33% by the clinic.



IF YOU USE TAPS YOU NEED

WALTON TAP EXTRACTORS

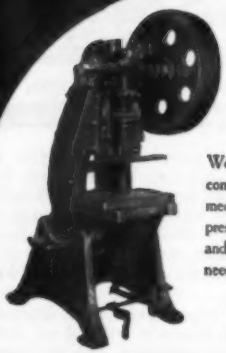
The price of a new tap is nothing, compared to the cost of removing the broken one by any other method. WALTON BACKS it out; saves the thread (and your time.)

Stock sizes 4 to 1½" in 2, 3 and 4-flute styles. Sent on 30 day free trial. Booklet 131 gives details and prices. Write for it today.

The Walton Co.

95 ALLYN STREET
HARTFORD, CONN.

RECLINABLE POWER PRESSES



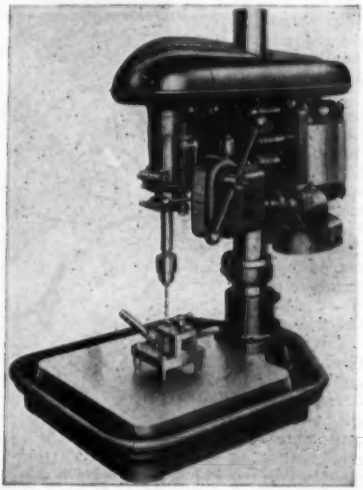
We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

Write for bulletins.

ZEH & HAHNEMANN CO.
Newark, New Jersey

Delta Power Feed Drilling Units

A new and improved type of low-cost power feed Delta press is announced. The unusual design of the



power feed unit, which operates directly off the bottom drive of the motor instead of all the spindle, makes possible a wide range of feeds, from .0010 to .016" per revolution of spindle in the slow-speed drill presses, and from .0005 to .009" in the high-speed machines.

The heart of the power feed is a husky bronze gear and a specially hardened and ground steel worm. Other special features include:—Quick traverse by hand from starting position to work; instant switching from power to hand feed and reverse without changing or removing parts; safety lock for preventing damage to drill press when power feed is disengaged; adjustable automatic stop and return.

This new line includes single and multiple spindle 17" units, in slow speed and high speed models, with table-raising or head-raising mechanism, powered with either Delta or standard NEMA frame motors. Manufacturer:—The Delta Mfg. Co., 603 E. Vienna Ave., Milwaukee, Wis.

Electric Power and Defense

Electric power demands far in excess of normal usage will be imposed by the defense program, a comprehensive study released by the National Ass'n. of Manufacturers indicates.

"At the start of its defense effort the United States was fortunate to have an electric power industry exceeding the maximum capacity of England, France, Germany, and Italy", the association says. "This industry has made electricity part of our daily lives and a necessity in almost every kind of business."

The Ass'n. finds that 70% of the nation's electric power is generated from steam while private and public hydro-electric projects produce 28%. Two per cent is produced by internal combustion engines.

"From these facilities, excluding factory owned power plants," the N. A. M. continues, were produced a total of 145 billion kilowatt hours in 1940, more than three times the output for 1920. These represented an average use of about 40% of power generating facilities."

The Ass'n. points out that peak load periods are never constant, nor do they occur simultaneously throughout the country. The load in the New York metropolitan area, for example, often occurs in December when days are short. Other areas may feel maximum power demands in the early fall because of seasonal plant operations, air conditioning, or other factors. In 1940, the survey says, the sum of peak demands for all power systems was 76% of installed capacity.

"To meet the demands of the national defense program," according to the report, "the private electric light and power companies will spend more than $1,000,000,000 on installations of new facilities of all kinds before long.

The N. A. M. says it is difficult to estimate what the effects of the defense program will be in terms of increased power demands. The Federal Power Commission estimates are in practically all cases higher than those of the private utilities.

TO-MORROW

TOMORROW you must make delive
Delivery dates are becoming increa
hard to meet and every tool in your plan
must be kept keen to maintain peak pro
duction.

CARBIDE tools have been a tremendou
factor in the Defense Program, but hig
efficiency in carbide tools is dependen
upon grinding. The GRENBY S-1 Surfac
Grinder is used extensively for carbide too
grinding. For this work it has no equal.

These features combine to give a perfec
grind on carbides:

- . . . smooth table feed, no chatter
- . . . spring loaded counterbalance
  spindle
- . . . precision spindle accurate to .000
- . . . simplified set-up
- . . . optional accessories

THE GRENBY line also includes Inter
nal, External, Flute and Cutter Grinders.

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PLAINVILLE, CONNECTIC

Holding Washers for Drilling

Small Work or Big Work—

DE-STA-CO *CLAMPS HOLD*

From small work like washers, to big work like automobile bodies—and for every operation from welding to machining—you'll find a De-Sta-Co quick-acting Toggle Clamp fitted to hold your parts securely, in production, and suited to your manufacturing processes.

Complete range of sizes and detailed specifications are shown in bulletin No. 41, sent on request.

DETROIT STAMPING CO.

Established Over 25 Years

347 Midland Ave • Detroit, Mich.

Standard Stock Knurls

A new bulletin shows the full line of standard stock Knurls offered by Reed Small Tool Works, 237 Chandler St., Worcester, Mass. It includes the full line of standard stock items, some of which are carried in High Speed Steel, as well as Carbon Steel. It is arranged to show at a glance just the type of work which will be turned out by any particular Knurl. This not only makes it easy to select the right Knurl but, also, is a time-saving feature and eliminates considerable guess work.

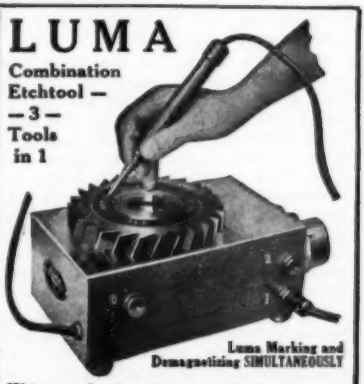
"Plus or Minus Millionths"

Pratt & Whitney Precision Gage Blocks are described in an attractive brochure just announced. The purpose of these Hoke and "U S A" gage blocks is treated along with several interesting pages on their manufacture. Their maker points out that blocks up to one inch are guaranteed flat and parallel within five millionths of an inch.

"Plus or Minus Millionths," as this booklet is titled, may be obtained from Pratt & Whitney, West Hartford, Conn.

LUMA

Combination Etchtool — —3— Tools in 1



Luma Marking and Demagnetizing SIMULTANEOUSLY

Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

Send for details—5-day FREE TRIAL OFFER!

Luma Electric Equipment Co.

Dept. H—Main P. O. Box 132, Toledo, Ohio

White Dials

White instrument dials that are not discolored by high temperature, light, chemical fumes, or moisture are being made at the Westinghouse Meter Div., it is reported. This is done by means of a recently developed liquid plastic material which is sprayed on metal much the same as lacquer or paint would be.

In typical tests previous white lacquered dials changed to a light coffee brown after 10 hours of exposure to dry air at a temperature of 317°F. Fumes from heated raw phenolic plastics changed white to straw color after 120 hours, and a saturated sulphur dioxide atmosphere mottled dials with yellow splotches after 100 hours. It is asserted that under identical test conditions the new plastic-coated dials were practically unchanged.

Foundation of the dial is metal sheet that is given a spray of the white plastic. It is hardened on the surface by quick heating and then dried completely by controlling baking in an electric oven.

In the spray room, dust and other air-borne particles are fought by unusual precautions. The room itself is sealed tightly and is kept under filtered air pressure during operation.

After coating, dial faces are lithographed on the metal sheets. Since the plastic surface is hard and almost completely impervious to ink, printing is an extremely delicate process. The special press is used in a carefully air conditioned room.

NEW Automatic WELD-TIMER

FOR UNIFORM WELDS
FASTER PRODUCTION

You can now get Ace Spot Welders fully equipped with our Peer Automatic Weld-Timer all in one unit ready for immediate installation and use. This Timer insures uniform good welds and faster production—it simplifies the job, makes operation easier, reduces spoilage and guards against unnecessary surface indentations and discoloring.

Regardless of how the foot pedal is operated exact timing is assured, permitting "green" operators to become expert quickly, and experienced ones to greatly increase their hourly output. Precision adjustments are easily made to set the timing for each job.

Peer Weld-Timer incorporates all the features dictated by our long experience in Spot Welder manufacture and it saves its cost many times over in increased output alone. Write for new Data Sheet 47.

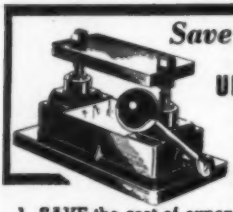
Pier Equipment Mfg. Co. 1428 Milton Street Benton Harbor, Mich.

PEER
ACE SPOT WELDERS
with New Automatic Timer

WIREGRIP Belt Hooks —6 sizes of tough hooks conveniently carded. No waste. Makes smooth humpless flexible joint on all flat belts.
STEELGRIP Lacing — 8 sizes, applied with a hammer. For all flat belts on tough drives. Prevents end fraying.
Here at one source are all belt lacing needs, dependable satisfactory products of guaranteed material and workmanship. *Write for Catalog.*

ARMSTRONG-BRAY & CO.
"The Belt Lacing People"
5364 Northwest Highway, Chicago, U. S. A.

Save 3 Ways
WITH THE
UNIVERSAL VISE
Only $29.75



1. SAVE the cost of expensive drill fixtures. You only need a simple bushing plate and adaptor for each job.

2. SAVE in tooling time. Build your fixture around a completely pre-designed drill jig body.

3. SAVE in production costs. Savings up to 60% in drilling time are not uncommon. Lever locks work instantly — holds securely. Throw it back and work is released. No complicated adjustments.

Let us send a vise for
10 DAYS FREE EXAMINATION
or write for illustrated folder

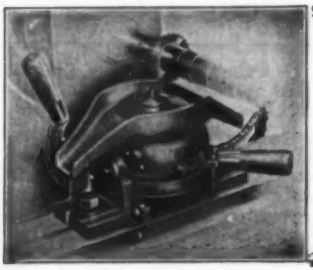
MOHR LINO-SAW CO.
130 N. Union Ave. Chicago, Ill.

Ultra-Chex Bulletin

A new 8-page folder, actually an educational treatment of the uses of gage blocks and optical flats, is offered by the George Scherr Co. as part of its program to disseminate precision measuring information to assist in defense production.

The broadside devotes two full pages to the uses of optical parallels and flats, showing actual charts in five colors, giving a simplified explanation of the light wave interference theory. In addition, the literature presents a number of photographs showing gage blocks in use to set adjustable limit snap gages, sine bars, checking micrometers and other uses. There is also a chart showing different ways in which gage blocks may also be used not only in inspection, but in setting up machine tools and other daily shop uses to increase production accuracy. Copies may be obtained by writing George Scherr Co., 122 Lafayette St., New York.

FOR DEFENSE SAKE
DON'T DISCARD YOUR WORN REAMERS.
WE RESTORE THEM TO
ORIGINAL DIAMETERS
ALL STANDARD HIGH SPEED STEEL
REAMERS WITH STRAIGHT FLUTES
DIAMETERS ½ TO 3 INCHES.
THEY WILL REAM MORE HOLES AND
COST LESS THAN NEW ONES
Abrasive Engineering Corp.
Spring Lake, Michigan



Mill Over 1,000 Parts Per Hour
WITH THE
NEW Dearborn Automatic Chucking and Indexing Fixture
Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.
J. W. DEARBORN
72 S. CLIFF ST. ANSONIA, CONN.

MACHINE TOOL BLUE BOOK

SELLEW DRILLHEADS

FOR SCREW MACHINES AND TURRET CHUCKING MACHINES

Rotating with and driven by chuck or through the Turret.
We also make MULTIPLE MILLING HEADS for carrying a number of small mills to perform a number of milling operations at the one stroke. MULTIPLE TAPPING HEADS, OFFSET overhung drillheads to get under shoulders or into cylinders, to drill up or down, DRILL SPEEDERS, and light high speed drillheads for attachment to motorized units.

STATE YOUR PROBLEM

SELLEW MACHINE TOOL CO.

PAWTUCKET —— RHODE ISLAND

Consult the AUTHORITY On SPEED REDUCERS!

WITHOUT COST! *Free ABART book gives you the right answer. Ask for it.*

ABART SPEED REDUCERS

Mean longest and most satisfactory service, money-saving, added profits. Precision-built—equal to severest stresses—with non-friction bearings—Abart Reducers pay for themselves.

ABART GEARS cut to your B/P or specifications. Let us estimate. Write

Abart GEAR AND MACHINE CO

P. I. V. Gear Catalog

Link-Belt Co., 2045 W. Hunting Park Ave. Philadelphia, has issued a new, 52-page catalog and data book No. 1874 on the Link-Belt P. I. V. Gear variable speed transmission—its positive, infinitely variable all-metal chain gear.

Units of ½ to 15 h.p., capacity with speed ratios of up to 6 to 1 are tabulated, illustrated, described. Speeds, torque ratings, dimensions, weights, and other data are given for all seven sizes, each available in five standard types, horizontal and vertical mountings. Many pictures of actual installations throughout the industries are shown.

Vascoloy-Ramet Catalog

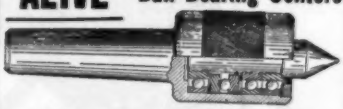
A completely revised general catalog of Vascoloy-Ramet Tantalum-Tungsten Carbide Tools and Blanks is announced by Vascoloy-Ramet Corp., North Chicago, Ill.

This is a new catalog listing 22 typical styles of single point tools, together with a grade selector chart giving recommended uses for the various grades. Included are instructions for ordering tools and blanks, also tables for computing costs of standard tools and blanks and special blanks.

Diamond Lapping Oil Bulletin by Stadoil

A bulletin on their diamond lapping oil is offered by Stadoil Mfg. Co., 3221 S. Figueroa St., Los Angeles. This oil is designed for use when sharpening cemented carbide tools on diamond impregnated discs or wheels of metal, bakelite, or composition type. This lapping oil is said to overcome the problem of loading and glazing of diamond wheels.

"ALIVE" Ball Bearing Centers



"They turn with the work"

Write TODAY — and let us tell you more about them.

MODERN MACHINE CORP.

323 Berry St., Brooklyn, N. Y.

MODEL NO. 16 "SPECIAL"

Constructed as per Specifications of U. S. Naval Aircraft Factories

Reg. U. S. Pat. Off.

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

Beware of Imitations: Our machine carries the Butterfly trade mark.

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10" Table; Model No. L—12" Table.

HARVEY MANUFACTURING CORP.
161 Grand St., New York
Phone: CAnal 6-5170

READY TO SHIP—

6", 9", 12" jaws

Sold with or without Attachments shown.

MULTI-PURPOSE VISE

DRILL SPEEDER

KNURL HOLDER fits lathe turret

Request Circulars.

Increases speed 3 times

GRAHAM MFG. CO. 53 Bridge Street, East Greenwich, R. I.

STURDY BUILT

for Long, Hard Service

BALDOR builds a complete line of Bench and Pedestal type grinders — 6" to 12" wheels. (At left, is special Carbide Tool Grinder, 6" wheels, complete for $84.00).

ASK FOR BULLETINS

BALDOR ELECTRIC COMPANY
4368 Duncan Ave., St. Louis, Mo.

BALDOR

BALL BEARING **GRINDERS**

Mr. Machine Tool Manufacturer—

FlexoiD SpeeD Control Units

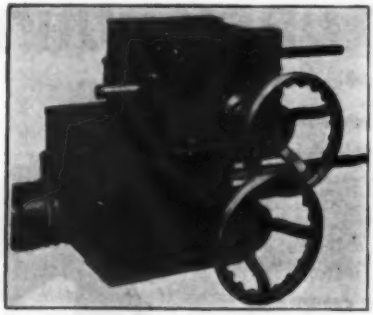
can be applied to your machine giving you an

A1 Ready Made Speed Change Box

These compact and sturdy units are as easily installed or interchanged as a motor.

Shafts and gears are made of alloy hardened steel. The one piece shafts are solidly mounted at each end in ball bearings and operate in a continual bath of oil.

4 and 8 Speed models are available



Shown above are 2 FlexoiD 8 Speed control Units incorporated in The Yoder horizontal boring mill as standard equipment.

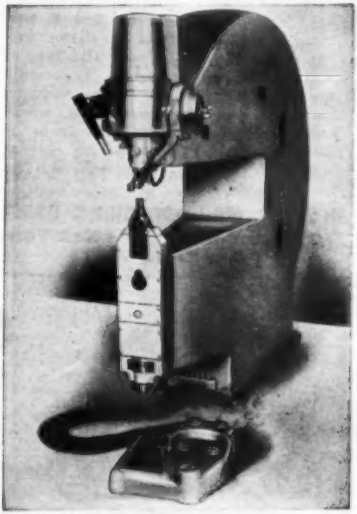
PST *May we submit detailed facts and figures*

The Smith Power Transmission Co.
1545 E. 23rd St., Cleveland, Ohio

Punching and Riveting

This new Model No. 1002 "Erco" Riveter has a 48" throat "C" Frame and is regularly equipped with an air operated remote control unit.

The remote control can be placed in any position for more conveniently handling and riveting large sections. The quick-drop anvil support operated by the same remote control unit provides a 4½" opening in the punching and riveting head for feeding and removing deeper channel sections.



A special "Erco" Spotlight indicates where hole is to be punched. The makers assert that the unit will automatically punch and countersink holes, feed and head rivets up to 3/16" in diameter in one continuous operation by depressing two foot buttons without shifting material, much faster than the combined operations can be performed by other methods. Full details are available from Engineering & Research Corp., Riverdale, Md.

Fray Announces "Junior" Boring Head

A "Junior" model Offset Boring

Head, of a size and design that should be useful to every toolmaker is announced by Fray Machine Tool Co., Glendale, Cal. The new head is an addition to the Fray "Standard" line of offset heads.

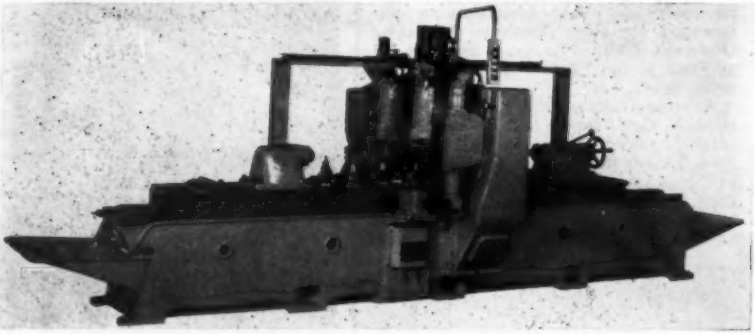
A special design feature is the retaining ring over the complete assembly, which assists in carrying the load thrown on the tool carrying block, and helps exclude chips from micrometer mechanism. Use of this retaining ring permits the round type of construction.

The "Junior" model has 2" body diameter, with overall head length of 1⅝ ", and offsets 5/16". The micrometer dial has 50 divisions of .001" each. The shank is ½" in diameter, straight, and there are three ⅜" receptacles for boring bars, of which two are supplied with each head.

Minimum length of the "Junior" model is claimed to assure accuracy and rigidity, so that a smooth hole may be bored. The makers emphasize that like all Fray tools, the Offset Boring Head is a product of expert toolmakers, for toolmakers' use. The head is made of nickel chromium steel, S. A. E. 3140.

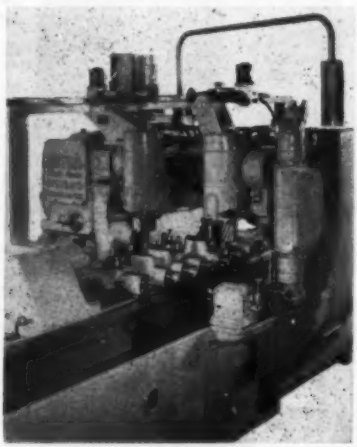
GET this INTERESTING DESCRIPTION OF AN OUTSTANDING BORING MILL!
YODER
MILLS
THE YODER SALES COMPANY
5209 WALWORTH AVENUE • CLEVELAND, OHIO
PROMPT DELIVERIES AVAILABLE

Sundstrand Propeller Edge Milling Machine



The Sundstrand Machine Tool Co., 2566 - 11th Street, Rockford, Ill. has recently completed a new machine for milling the edges of propeller blades. Built around the Fluid-Screw Rigid-mil, the machine has a number of interesting special features for this particular operation.

In order to mill both sides of the blade simultaneously, the machine is provided with two vertical type spindle heads mounted on a cross rail. Movement of each head along cross rail is controlled by a hydraulic duplicator attachment. Attached to machine table is a two-sided cam on which duplicator "fingers" ride. As the table feeds longitudinally, the cam, through duplicator attachments, controls cross movement of head to transfer the desired shape to contour of the part. The heads are both driven from one gear box and have pick-off gears for simultaneously changing speed of both spindles.



The part is held on machine table between a headstock and footstock member and is supported at intermittent points by jacks. Using spiral milling cutters, spindles are arranged to rotate so that the cutting thrust is down against the jacks. This helps hold the part rigidly in the work-holding fixture.

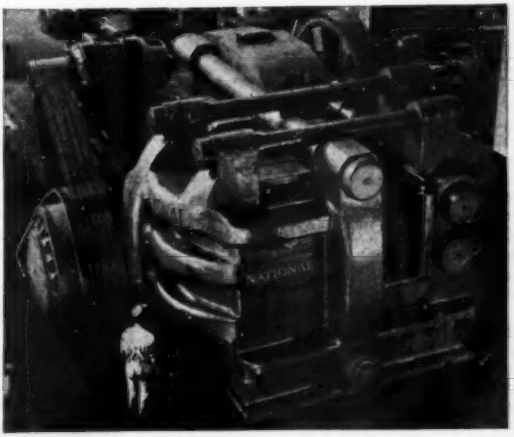
After part is loaded in fixture, operator presses buttons on electrical control pendant which start spindle, hydraulic, and coolant motors. Movement of control lever on front of machine bed then starts an automatic cycle in which the heads rapid traverse crosswise (in opposed direction) until duplicator "fingers" contact master template after which cross movement is controlled by the duplicator attachment. At the same time, table starts to feed work longitudinally between cutters. At end of cut, a table control dog reverses direction of table feed and

the heads rapid return to starting position where they trip a limit switch which automatically changes table traverse from reverse feed to rapid return. Table stops automatically at end of rapid stroke. As a safety feature, cycle is so arranged that machine table cannot traverse in rapid when heads are in the cutting position.

The machine has 90" of power feed in a feed range from ½ to 38" per minute (or rapid traverse at 300" per minute). Feed unit is of the Fluid-Screw Rigidmil type in which table is actuated by a screw which, in turn, is controlled by a hydraulic transmission. This arrangement provides the advantages of mechanical feed with the flexibility and ease of control of hydraulic feed.

Giant Forging Machine

Wide attention has been attracted to current delivery of what are said to be the world's largest forging machines, one in November and the other in February to Tube-Turns, Inc., manufacturers of Tube - Turn welding fittings, at Louisville, Ky.



Because these mammoth forges represent a far reaching development in the scope and capacity of forging operations, industry and defense bodies are keenly interested in their performance. They will be put to work immediately in the production of airplane motor cylinder forgings and other vital armament needs included in the defense orders held by this company.

These two huge forges are rated at 9" capacity—a feat of designing and construction viewed as impossible a few years ago. Some idea of their size may be gained from these figures:—Each machine weighs over 500,000 lbs., and requires well over a year to build. One of the most significant features is the extreme compactness, which can be visualized by considering that the weight of each machine is greater than the combined weight of 140 automobiles. If parked end to end, these cars would extend for more than half a mile—yet this unit occupies floor space sufficient to accommodate only four cars.

Industrial Pumps

Practical information concerning pump adaptation for a wide range of duties under varying conditions is the theme of a new industrial catalog.

This brochure contains not only a profusion of illustrated case histories of varied applications, but also presents many practical drawings for laying in this type of pump.

Address Pomona Pump Co., 206 E. Commercial St., Pomona, Cal.

GES Electric Hand Shears

The new GES-9 Electric Hand Shear is of the nibbler type. Though light in weight, it is a powerful, fast-cutting tool, capable of cutting to the line along straight lines as well as along small curves.

It is claimed to cut 14-gauge sheet steel or 16-gauge stainless, and as it is of sturdy design and construction, should give long and useful service.

The ball bearing "grip" type universal motor, built into the handle, is of ⅛th h. p., and can be supplied to operate on either a.c. or d.c., 110 or 220 volts, 25 to 60 cycles (specify current characteristics when ordering). Fuse protection is incorporated in the switch box, safeguarding the tool against overloading.

Cutters are of a special alloy steel and should give long service. They can be resharpened easily and readjusted as required.

Sheet steel of 14 gauge can be cut at a rate of approximately 6'6" and it is stated that other gauges are handled at proportionate rates.

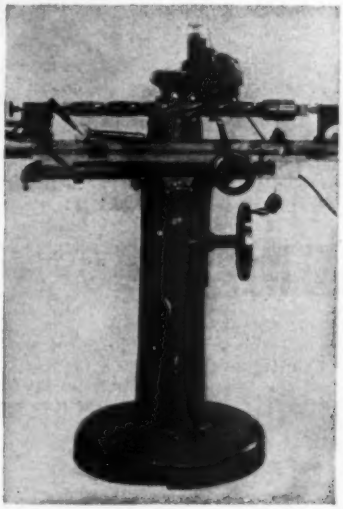
Weight of the unit is given as 6-lbs., and it is provided with 17-feet of cable and plug.

Address A. Klingelhofer, Inc., 103 Lafayette St., New York, N. Y., for full details.

Circular Relief Grinding

The essential and formerly difficult job of circular relief grinding is handled with one machine, one operation and one set-up by means of a versatile unit developed by The Cleveland Tool Engineering Co., 9200 Detroit Ave., Cleveland, Ohio.

It features an elevating screw graduated to "tenths"; cross slide screw graduated to thousandths and a cam holder for any desired curve, angle, flat or back taper. Frictionless scale point centers are provided; also a screw for raising center to grind plain tapers, as well as a quick-acting spring tension center. There is an adjustable positive stop for back tapers and a graduated, adjustable diamond wheel dresser. The head swivels for spirals and is graduated in degrees. Motor base is adjustable. Maximum swing on centers is 7"—floor space required is 2-ft. x 6½-ft., and weight is about 600-lbs. Maximum table travel is 26" and no special tools are required for any adjustment. Standard motor equipment is for 110 volts, 60 cycles, single phase.



In operation, outside face of the wheel is dressed concavely to exactly the same curve as the tool to be ground. Tool is then offset from center of wheel to give the desired clearance. Then it is ground clear to the cutting edge in one operation. Circular relief being ground to exactly the same curve as the tool leaves the outside of the tool convex, preserving all the metal possible to support the cutting edge. The degree of clearance is determined by the distance tool is moved in or out against curve of the grinding wheel.

The illustration shows just one of the many operations that may be performed—grinding of a New York Central frame bolt reamer, 26" long, 3/16" taper per foot.

Chicago Carborundum Exhibit

The Carborundum Co., Niagara Falls, N. Y., recently opened an educational exhibit at the Chicago Museum of Science and Industry.

The detailed processes involved in creating the two abrasives, Carborundum Brand Silicon Carbide and Aloxite Brand Aluminum Oxide, are portrayed in a series of dioramas showing scale models of the electric furnaces in which the abrasives are produced.

A unique feature is the Hardness Test. Visitors are able to determine by means of this test, the relative hardness of various materials, ranging up to the diamond, including glass, tool steel, silicon carbide, aluminum oxide, marble, etc.

The exhibit also includes turntables divided into sections which carry examples of various products which have been ground, finished or sanded by Carborundum grinding wheels and coated abrasives. On display are extremely accurate and perfectly finished automobile and airplane parts and various tools such as reamers, drills, milling cutters, cemented carbide turning tools, etc.

A sound film is also presented, depicting Dr. Acheson re-enacting his first classic experiment as well as an intimate trip through the Carborundum plant showing the electric furnaces in actual operation, and other steps in abrasive manufacture.

GOOD DELIVERIES
on
Flexible Shaft Machines

Aside from the fact that we build a sturdy machine, our flexible shaft cores are of the cold wound type and THEY WILL NOT UNRAVEL when breaking.

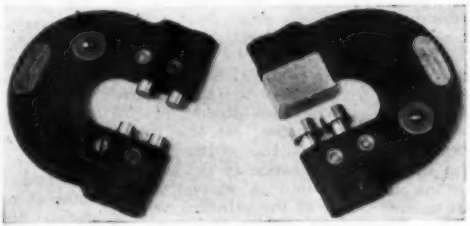
Several of the Government plants owned by the Defense Plant Corporation, are using our machines, after several engineering groups passed and approved the specifications.

Not illustrated—Bench and Overhead Models. All models in either Single or Multiple Speed.

Prices range from $51.75 to $230.00. Sizes ¼ HP to 2 HP motors.

ACME TOOL COMPANY
125 CHURCH ST. NEW YORK, N. Y.

Atlantic Adjustable Limit Snap Gages



The George Scherr Co., 122 Lafayette St., New York, announces its own line of Atlantic adjustable limit snap gages manufactured in the U. S. A. in accordance with American gage design standards. These are produced in a modern gage and instrument shop equipped with special machinery and tools for fine machining, grinding and lapping. The two types already being supplied to arsenals and defense industries are shown.

Atlantic frames are of Meehanite Castings. This is a special metal, selected because of its high tensile strength and because of its freedom from warping or shrinking.

Atlantic gages are manufactured in two standard types, namely, Model "A" with four gaging buttons and Model "C" with solid block and two gaging anvils. They are now made in 30 different sizes.

F-400 Drilling Machine

A new F-400 "Hi-Duty" Drilling Machine is available in ½" maximum chuck capacity, in either bench or floor type models, with or without electric motors.

Equipment of this new ball bearing drilling machine includes: - Jacobs Chuck, cord and switch, depth gauge. V-belt drive is fully guarded.

Drill range is 1/32" to ½" and unit drills to center of 16" circle. Travel of Spindle is 4-⅜" and a 1/3 h.p. motor is used. Table is 12"x11"; base 18"x11-½" and Work Table is 10"x11". Column is 2-¾" in diameter. Adjustable head has 24" Travel. Spindle is ¾" in diameter. Spindle speeds are 860, 1375, 2150 and 3450 r. p. m. Height overall is 42-½" and weight is 219 pounds complete. Positive lubrication is provided.

Address Taylor Mfg. Co., 3056 W. Meinecke Ave., Milwaukee, Wis., for further details.

Walker-Turner Polishing Lathes

Adaptable to handling many jobs now being done on conventional lathes or similar machines, these new foot-operated speed lathes will be found to have many uses in all types of manufacturing and fabricating plants. These uses cover polishing, burring and lapping on ferrous metals, non-ferrous metals and plastics. The lathes will chuck rounds, tubing and hexagonal shapes up to 2" in diameter. They are being used extensively in the aviation industry to polish engine parts such as valves, push rods, bolts and like parts at a great saving in time and material.

These speed lathes are equipped with three phase motors in direct drive or gear drive types. A pedal controls the motor switch and a synchronized brake, which brings spindle to an instant stop when motor circuit is broken. The brake will hold spindle stationary while work in the chuck is being changed.

They are available with either Jacobs chuck in ½" or ¾" capacity or a 4"

3-jaw universal lathe chuck. Speed ranges from 950 to 7200 r.p.m. Also available with two-speed motors. Overall height is 42" and weights depending on motor are up to 300 lbs.

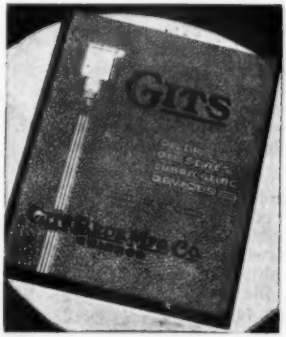
Full information, prices, and engineering service are available from Walker-Turner Co., Inc., 1751 Berckman St., Plainfield, N. J.

Lubrication Manual

A new 172-page Catalog is offered by Gits Bros. Mfg. Co., 1860 So. Kilbourn Ave., Chicago, which is practically an engineering manual on the subject of lubrication for the use of design engineers. It is based on 30 years' experience in the manufacture of lubricating devices exclusively.

Gits Bros. manufacture practically every known device for the application of fluid lubricants. Probably no concern is better qualified to prepare and issue authentic information about lubrication and the proper selection and use of lubricating devices. The Catalog contains over a thousand illustrations.

Nationwide distribution of the new Catalog to regular Gits Bros. customers has just been completed, and a limited supply of additional copies is available



for engineers, purchasing agents and others who are interested in the selection and purchase of lubricating devices. Requests should be made on business stationery.

Cutting Edges That Make Possible
Exceptional Finish Milling

The flutes of Putnam Cutting Tools are designed and ground for smooth, accurate cutting performance. Too, they are of a high speed steel which resists wear and breakage. For these reasons, Putnam End Mills can be run—without fear of failure—at the speeds which make possible unusually high finishes with the milling operations alone.

You'll find many advantages in the use of the end mills, counterbores and reamers manufactured by Putnam. If you are not entirely familiar with the various lines, write today for your copy of the Putnam catalog.

PUTNAM TOOL COMPANY

2983 Charlevoix Avenue · Detroit, Michigan

Hammond "J" Automatic Polisher

For special "defense" polishing and buffing jobs, Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Mich., has developed a Rotary Automatic Polishing Machine capable of handling a wide variety of circular pieces.

Aluminum pistons for aircraft engines, fuse bodies, the ogive and bourrelet of 37 mm shells, all are said to be within the scope of this automatic machine. Polishing the soldered joints of 75 mm. shell windshields and other special jobs involving circular parts are also easily accomplished. To change from polishing or buffing of one piece to another of a different type requires only a simple change of work holders or magnetic chucks.

The Polisher consists of a circular aluminum table mounted over a heavy cast-iron base. The table indexes automatically, rotating 6 to 8 chucks which pass under as many as 4 polishing heads mounted in pedestals which stand on the floor around the machine.

Chucks are stationary during loading or unloading. Spindles carrying work-holders revolve with table, driven by sprocket and chain from a speed reducer in base. Speed changes are easily made, both in spindle revolutions and number of table indexes per hour.

Polishing heads are independently driven, either by V-belts from motor on base or direct from motor on spindle. Controls for all heads are mounted on a master control board conveniently located at front.

A "full floating" arrangement permits adjusting pressure of polishing heads so the buff rides over the work and provides uniform pressure at all points. Buffing wheels may be adjusted to any angle desired. As table indexes, wheels automatically lift in and out of recesses as required. Composition is applied automatically by air-pressure with the Autodoper, an accessory attachment.

Only one operator is required to carry on the polishing operations. Machine shown is equipped to handle circular pieces of all types. By substituting magnetic chucks, small flats may be polished or buffed.

Manufacturers are invited to send samples of work they propose to polish or buff. Full details relative to such jobs will be furnished promptly.

Combination Drill Table

A Combination Safety Drill Table and Vise which should facilitate the handling of difficult jobs and cut labor costs materially is offered by the Eastern Distributors, Acme Tool Co., 125 Church St., New York City.

Several models are available from the No. 8 which is 8" in diameter when closed, up to the largest, Model 28, which is 27½" in diameter closed. Jaws of the No. 8 open 4½"; table open is

8"x12¼", the steel jaw faces are 8"x 1¼" and net weight is 27-lbs. Jaws of the Model 28 open 12"; table open is 27½" x 39½"; steel jaw faces are 27½"x3" and net weight is 600-lbs.

Pedestals are available for the Nos. 16, 19 and 28 Models. Brackets can be provided for attaching the models 8, 16 and 19 tables to radial drills. For radial drills, most users prefer to set the pedestals direct on the beds of the drills. Arms are available for attaching tables to different makes of drills.

The utility of the Vises is evident from the illustration. When machines have proper vise equipment, there is no incentive to hold work pieces by hand and invite personal injury.

Model "XL" Reciprocating Sander

To meet the heavy service of two and three shift duty demanded today by the defense industries, the manufacturers of the Easy Sander announce an improved "XL" model.

It is claimed that vibration has been reduced to a minimum through precision balancing and redesign of handle mountings. An interchangeable front handle, which can be shifted from front to side position, enables the operator to work into close corners, at right angles and directly against vertical surfaces.

Motor, filter and switch are now readily accessible through use of a new type motor filter cap. These machines are available with 110 or 220 volt motors.

The Model XL is adapted for practically every finishing application—sanding, rubbing, polishing—on metal, plastics, wood, leather or composition materials.

For complete details which are given in an attractive new bulletin, write the manufacturers—The Detroit Surfacing Machine Co., 7433 W. Davison, Detroit, Mich.

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For tools and die-makers. Liquid form ready for immediate use! Quick-drying, non-rubbing. Scribe shows clear, distinct line without chipping or scraping off.

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Aaron Machinery Co.,
176 Lafayette St., New York, N. Y.

Gridley, Model F, 4 spindle, ⅜".
Gridley, single spindle, 3½".
Borer, Rockford 3" horizontal.
Drills, radial, 3" Morris, 3½', 4' Mueller, m.d.
Eyeletting machines, United Shoe, Model B.
Gear hobbers, G. & E. & Shuchardt & Schutte.
Gear hobbers, Barber-Colman, No. 2.
Gear shaper, No. 6 Fellows.
Grinders Brown & Sharpe No. 1, 2, universal.
Grinders, Bryant No. 6 internal.
Grinder, Churchill Morgan internal.
Grinders, No. 55, 60, 65, Heald internal.
Hammers, Pettingell trip, No. 1, 2.
Lathes, 16x8, 18x8, 18x10', quick change.
Lathe, Hendey 24x8', 9 speed, geared head.
Lathe, Hendey, yoke, 14", 20".
Lathe, 24x10' Wickes Bros., q c., 3 step cone, heavy
Lathe, 24x10' Crawford, 3 step cone, heavy.
Lathe, 21x10' Reed-Prentice, grd. head, m.d.
Lathe, 21"x14' Reed-Prentice, geared head.
Lathe, Pond 39x21'.
Lathe, 18-36"x7'-10' Fay Scott, sliding bed gap.
Hardons & Oliver No. 2, 4.
Miller, Cincinnati No. 4 plain.
Miller, Cleveland No. 1 plain, s p.d.
Millers, B. & S., Cincinnati No. 2, 3.
Millers, Brown & Sharpe No. 12 production.
Miller, Cincinnati No. 3 Universal.
Miller, Kempsmith No. 1 universal.
Screw machine, Cleveland ¾" Model A.
Shaper, Ohio 16", s.p.d.
Shapers, crank, 14", 16", 20", 21", 36".
Shaper, Lynd-Farquhar, open side, m.d.
Turret lathes, Gisholt, 25", 21".
Turret lathe, P & W., 3" bar feed.
Turret lathe, Millholland, 18" friction head.
Turret lathe, W. & S. No. 2, 6.
Turret lathe, J. & L., 2½, 3½".
Turret lathe, P. & W. 24x26" grd. hd., s.p.d.
Hydraulic pumps, presses, accumulators.

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Sheet metal working machinery, hand and power.
All types of new and reconditioned equipment.
Apron brakes, press brakes, shears, folders.
Bending rolls, corrugating rolls, forming rolls.
Punches, beaders, rotary machines, stakes, etc.

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Automatic, Gridleys, 1¼", 4 spindle.
Automatic, Gridleys, 2½", 4 spindle.
Boring mill, Rock, horiz., 3" bar.
Boring mill, Morris horiz., 3" bar.
Grinder, Bryant No. 10A.
Grinder, Heald, 65, internal, Like new.
Grinder, Landis, 12x24, self contained.
Grinder, modern self contained, 16"x60", m.d.
Lathe, 26"x12' Schumacher-Boye, quick change.
Handscrew machines, Bardon & Oliver No. 4.
Mill, Milwaukee, No. 1 power feeds in all directions.
Miller, vertical, Becker No. 5B, power feeds.
Pipe bender, Wallace, 2" cap.
Pratt & Whitney worm gear Grinder, m.d.
Tapping machine, Garvin No. 2.
Turret lathes, J. & L., 2x24, (3); 3x36, (1).
Thread cut., Coul. auto. 6' g.h. 6"x24" s.p.d., steel pans
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GUN DRILLS

1 Pratt & Whitney & 5 Bausch, 2 spindle horiz. 1½" cap, size 13x9'8" bed, swing 7".
Boring bar, 3", Beaman & Smith horiz., floor type gear box, motor drive.
Broach, LaPointe-Hudson, No. 3, m. d, cut keyway to 1⅜", bro. sq. holes to 3½" across flats, 54" stroke
Lathe, Johnson, 21"x14', gd. hd., 3 steady rests, face plate, arr. m.d.
Lathe, Fitchburg 3½"x80" low swing, gd hd., 2 carr.
Lathe, 20"x10' Whitcomb-B., gd. hd., m d., complete.
Lathe, Harrington 42" gap, 15' between centers when bed is open.
Pipe threading machine, cap. 2" to 8" arr. m. d., including 8 dies, cutting-off attach. & oil pump.
Planer, 26"x26"x6' Hamilton, 1 head on cross rail
Planer, 36"x36"x16', 6" bed, Gray, 2 hds. on rail.
Turret lathe, J & L, 2½" spdl., 18" swing, single pul drive, geared head, extra tools.

Factory & Mill Supply Co., Inc.
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Milling machine, No. 3-M Potter & Johnson, auto.
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Drill, 20" Excelsior, b. g. p. f, arranged motor drive.
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Pipe machine, No. 304-B Oster, cap. 1" to 4"—m. d.
Planer, 36"x36"x24' Chandler 2 heads, cross rail, m. d.
Planer, 30"x30"x8' Cincinnati 1 hd., cross rail, m. d.
Press, Hickley Meyers straightening, V blocks & cen.
Press, Lucas 15-ton power forcing, m. d., complete with a. c. motor & V block, weight 2100 lbs.
Punch & shear, cap. punch 1½" hole thru 1" plate, 24" stroke, 8½" throat steel ram, weight 11450 lbs.
Shaper, 16" crank, single geared vise & c/s.—A-1.
Misc.—Anvil, Forge, homemade power hacksaw 4" cap. reamers, drills, dbl. fric. countershafts.

Alex Zeeve & Company
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Bolt threaders, 4" Landis, 3" Acme "Class A", 1¼" National.
Boring mills, vertical, 51" Bullard, 2 heads, m.d., 34" Rogers, spd.
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Drill, radial, 3' Mueller, gear box, s.p.d., box table.
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Miller, No. 6 Whitney, hand, a. c., m.d.
Planers, 36"x36"x14' Woodward-Powell, 1 rail head, 1 side hd.; 36"x36"x10' Pond, 2 rail hds., 2 side hds.
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Turret lathe, 2"x26" Pratt & Whitney, b. g., hex turret, with cross-slide.

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Drill press, 20", hydraulic feed, motor driven.
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Jones Machine Tool Company
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- No. 1½ Amer. pl. cone dr.
- No. 3 B. & Sharp, plain.

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- 16"x10' L&S. 3 step, dbg.
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- 20"x10' Hamilton, q. c.,
- 18"x12' Boye & Em., q.c.
- 24"x12' New Haven, q.c., cone drive.
- No. 6 W. & S. turret.
- 14x6 Lodge & Ship., q. c.
- 20"x10' LeB. l.c. cone dr.
- 26"x12' Reed, l. c., c. d.
- 32"x16' Pitts. l.c. cone dr.
- 30"x16' L & Davis, l.c. Dreses tur. 16" swing.

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- 24" Cin. b. g., cone dr.
- 24" American, cone dr.
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- 36"x12' American, 1 hd.
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- No. 2 Robinson, b.d. inc.
- No. 76 Tol. s. a. b. g.
- No. 1 L. & A. dble. end Wickes, sgle. end punch, 26" throat.
- No. 2 R&K inc. press.
- No. 15 Tol. deep throat punch.
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- 12"x12" Racine hk. saws.
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- No. 2 Oakley t. &c. grind-

Fuchs Machinery & Supply Co.
1102-4 Farnam St., Omaha, Nebraska

Automatic, No. 82 National Acme, 4 spindle.
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Automatic, Model G Gridley.
Drill, 2 spdl. Henry Wright, 15" overhang, prod. table.
Drill, 4 spdl. 20" b. g., p. f., V belt motor drives.
Grinder, Micro internal cylinder, m. d.
Grinder, Norton universal tool.
Grinder, pedestal, 7½ h.p., U.S.
Hammers, 25, 50 & 100 lb. Little Giant.
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Lathe, 16"x8' Sidney, q. c., d. b. g.
Lathe, 18"x8' Chard, q. c., d. b. g.
Lathe, 20"x10' Monarch, q. c., d. b. g.
Miller, No. 2 Kempsmith universal.
Miller, No. 1 U. S. hand.
Miller, No. 3 Burke hand.
Miller, No. 2 Garvin plain.
Presses, o. b. i. Nos. 1, 2 3, 5.
Press, No. 67½-A Stoll double crank.
Press, No. 6-E Rockford double crank.
Press, No. 54 DAG Ferracute, double acting cam.
Shear, No. 2 Ryerson serpentine.
Shear, 84" Pexto power.
Shear, ½" Kling plate splitting.
Shaper, 20" Smith & Mills, single pulley drive.
Tapper, No. 2BC Garvin vertical.

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FOR SALE BY

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Air compressor, 10"x10" Ing-Rand, 200 c.f., m.d.
Bolt cutter, 1" Landis, 1½"-3" agl. hd., b. d.
Bolt cutters, 1" Acme, Landis hds., 2 & 3 spdl.
Bolt cutter, staybolt 1½" Acme, leadscrew, m.d.
Boring mill, 36" Bridgeport, grd. feeds, m. d.
Boring mill, horiz. Barret 34" b.d.
Boring mill, horiz., 5" bar Barrett, b.d.
Brake, 8'x12 gauge D & K leaf type, s.p.d.
Bulldozers, No. 2 & No. 4 Wms. & White, m.d.
Crane, 5 ton OET, 43'6" span, m. d.
Column facer, 30" dia. Espen Lucas, b.d.
Cut-off machine, 16" Treadwell, m.d.
Die filer, No. 3 Thiel, b.d.
Drill, 2-spindle Woodward-Rogers, m. d.
Drill, mult. No. 3 Rockford 3 spdl., s.p.d.
Drill, mult. 10 spindle D-12 Fox, b. d.
Drill, radial, 2½" Mueller, t.a., m.d.
Drill, radial, 3½' Prentice, t. a., b. d.
Drill, radial, 3' Bickford, t. a., m. d.
Drills, upright, 11" to 34", b. d. & m. d.
Gear cutter, spur, 30"x16", B. & E., m. d,
Gear cutter, 40"x12" G & E, s.p.d.
Gear cutter, spur, 84" Newark, m. d.
Gear planer, 36" Gleason, bevel, m.d.
Gear planer, 54" Gleason, bevel, m. d.
Generator, 100 KW Westinghouse d. c., 125 v. b. d.
Generator, 150 KW Jeffrey, d. c. 250 v. b. d.
Grinder, centerless No. 2 Cincinnati, m.d.
Grinder, dbl. end, Standard Elec. 7½ H. P. 230 v. d. c.
Grinder, dbl. end, 24" Marschke, m. d.
Grinder, drill, No. 5 Oliver, m d.
Grinder, gear tooth, Detroit No. D-12, m. d.
Grinder, internal cylinder, No. 5 Landis, b. d.
Grinder, surface, 14" P&W, b.b., m.d.
Grinder, tool & cutter, Ingersoll inserted tooth, m.d.
Grinder, univ., No. 5 B. & S., 20"x72", b. d.
Grinder, worm-hob, Pfauter "PS", b.d.
Grinder, cyl., 10"x36" Landis, b.d.
Grinder, No. 00 Heald, b. d.
Hammer, power, 300-lb. Bradley, upright helve.
Hammers, steam drop, 400-lb. to 8000-lbs
Hammers, steam forging, 800 lbs.—4000 lbs.
Keyseater, No. 2½ Baker, m. d.
Lathe, 13"x6' Smith, semi-q. c. g , d. b. g., b. d.
Lathe, 14"x6' Rockford, semi-q. c. g., d. b. g., b. d.
Lathe, 15"x10' Sebastian, p. c. g., s. b. g., b. d.
Lathe, 15"—24"x8' Sebastian grd. head, m. d.
Lathe, 16"x10' Bradford. grd. head, q. c. g., m. d.
Lathe, 16"x24"x8' So. Bend, gap, b.d.
Lathe, 17"x6' LeBlond, automobile, b. d.
Lathe, 17"x8' LeBlond, q.c.g., d.b.g., b. d.
Lathe, 18"x6' American, q. c. g., d. b. g., t. a., b. d.
Lathe, 18"x8' Prentice, p. c. g., t. a., b. d.
Lathe, grd. hd., 18"x8' American, t.a., m.d.
Lathe, 16"x8' Reed-Prentice, q.c.g., b.d.
Lathe, 18"x8' Prentice turning, d. b. g., p. c. g., b. d.
Lathe, 18"x8' Mueller, q.c.g., d.b.g., b.d.
Lathe, 19"x10' Hendey, q. c. g., b. d.
Lathe, 20"x8' Reed, p.c.g., s.b.g., b.d.
Lathe, 20"x10' Hamilton g d. head, q.c. g., s.p. d.
Lathe, 24"x16' Bradford, t.a., b.d.
Lathe, 24"x12' American grd. head, m.d.
Lathe, 27"x11' Le Blond, grd. hd., q.c.g., d.b.g., m.d.
Lathe, 27"x12' Putnam, hvy. duty, q. c. g., d.b.g., b. d.
Lathe, 36"x14' Putnam hvy. duty, d.b.g., b.d.
Lathe, 36"x18' American, p. c. g., t. a., b. d.
Lathe, 36"x26' 6" New Haven, p. c. g., b. d.
Lathe, 42"x22' American, b.d.
Lathe, 42"x 20' Springfield trip. grd., p. c. g, b, d.
Lathe, 46"x 17'7" Pond, triple grd., p.c.g., b.d.

Lathe, 48"x23½" Johnson, trip.gd. int .face pl. dr. b.d
Lathe, 48"x26½" Johnson, trip. gd. int. face pl. dr. b.d
Lathe, 60"x20' Niles, b. gb.d.
Lathe, gun boring, 2 bar, cap. hole 12"x40', m. d.
Lathe, turret, 18" Reed, h.s., 1½", p. f., b. d.
Lathe, turret, 24"x24" Jones-Lamson, s.p.d.
Lathe, turret, 36" Libby "C", h.s. 7½", s.p.d.
Leveller, 84" Bertsch 7 rolls, m. d.
Miller, plain No. 14 Garvin, tbl. 43½"x13½", b.d.
Miller, Vert. Taylor & Fenn, tbl. 30½"x6", m. d.
Pickling machine, Mesta, 8-12' arms.
Pipe machines, 8" Williams, 2½" to 8" motor drive.
Planer, 24"x24"x8' New Haven, 1 head, b.d.
Planer, 30"x30"x8' Cincinnati., 2 heads, m.d.
Planer, 36"x36"x10' American, 2 heads, m. d.
Planer, 36"x36"x11' Sellers, 2 heads, rev. m.d.
Press, double acting, No. 1 Bliss, roller feed.
Pr. ss, dbl. cr., 96-F Toledo, 12" str., Bolster 65"x124"
Press, end wheel Stiles-Parker, stroke 1½".
Press, hydraulic, 100 ton, Watson-Stillman, m. d.
Press, 250 ton Baldwin-Southwark 4-post.
Press, forging, 1500 ton Farrell-Birmingham, m.d.
Press, o. b. i. No. 65-C Bliss, stroke 8".
Press, O.B.I. No. 2 Losbaugh-Jordan, stroke 2".
Press, perforating, No. 5 W & S, str. ½", dbl. crk., b.d.
Press, straightening, Hunt hydraulic, 50 tons.
Press, toggle, No. 1½ Bliss, m.d.
Pump, Worthington 9"x2"x12", 22 gpm. 3000 lb. steam
Punch, lever, No. 58 Niagara, 36" throat.
Punch, mult. 10' L & A, cap. 340 tons pressure.
Punch & shear, No. 3 L & A, rap. act. ⅜"-⅝".
Punch & s., No. 2 H. & J, d.e., thrt. 36", m.d., 1" thru 1½"
Punch & shear, Cleveland KF, 1½" thru 1", m.d.
Punch & s., No. 3 H & J, d.e., thrt. 36", 1⅜" thru 1", m.d.
Punch & shear, Cleveland "G", 2" thru 1", m. d.
Punch, No. 2 H & J, thrt. 48", 1"-1", m.d.
Punch, No. 4 H & J, 1" thru 1", m.d.
Riveter, pneu., Hanna, 30 ton, 75" reach.
Riveter, pneu., Hanna, 80 ton, 126" reach.
Riveter, pneu., Hanna, 150 ton, 150" reach.
Saw, band Type JM Laidlaw, 20", m. d.
Saw, cold, Espen Lucas, blade 22", cap. 6" rd.
Screw machine, No. 1 W. & S., cap. ⅜", b. d.
Shaper, draw-cut 48" Morton, m.d.
Shaper, traveling head, 50", Bement, m.d.
Shaper, 16" Cincinnati hi-duty, b.d.
Shear, allig. Pittsburgh, cap. 2"-3½", m. d.
Shear, allig. No. 7 United, 6" square, m. d.
Shear, alligator, No. 61 Carlin, 3" round high knife.
Shear, circle, No. 05 Niagara, b. d
Shear, allig. No. 4 D&K, cap. 5", m.d.
Shear, foot Niagara 26"x16 gauge.
Shear, plate, 72"x1" United, m. d.
Shear, plate, 119"x¼" Wheeling, gap, 18", m.d.
Shear, plate, 10'x¼" Pittsburgh, gap, 15½", m. d.
Shear, plate, 96"x¼" Mesta, thrt. 35", s.d.
Shear, plate, 125"x3/16" Hyde Park, gap 15", m.d.
Shears, plate 156"x3/16 Hyde Park, gap 17", m. d. (2
Shear, plate 156"x3/16" Standard, gap 15", m.d.
Shear, plate, 96"x¼" Morgan, m.d.
Shear, sq. 84"x3/16", Hyde Park, thrt. 9½".
Shear, sq. 84"x3/16", Wheeling, thrt. 9".
Shear, sq., 36"x¼" United, b.d.
Shear, squaring, 72"x18 ga. Streine, m.d.
Slotter, 18" Bement, table 36" b. d.
Upsetter, 4" Ajax, steel bed, m.d.
Upsetter, 2½" Acme, steel bed, m.d.
Vertical attachments, Nos. 1, 2, 4 and 5 millers.
Straight'ner, shape, No. 3 Sutton, 2-way, cap. 2½", m.d
Tapping machine, duplex Garvin 2-X, ½"-1", b.d.
Thread Miller, Smalley-General, cap. 14"x3", m.d.
Welders, 150 amps, and 200 amps, portable.

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4 AUTOMATIC SCREW MACHINES
(Turret forming) Brown & Sharpe No. 00; completely rebuilt.....$1200

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WORLD'S LARGEST STOCK
POWER PRESSES

No. 183D Cleveland, double crank, 76", crank 4".
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No. 165 Consolidated, double crank, 36".
No. 4 United Eng. & Fdry., 4 crank, 156" between uprights, 8" dia. crank 7½" stroke, weight 118000 lbs.
No. 6B Niagara, dbl. crank 36", crank 3½".
No. S 126 Ferracute, dbl. crank 124", crank 7½"—9".
No. 106 Bliss gap, double crank, geared.
Nos. 92B, 91B & 91C Toledo, double crank.
No. 506 Bliss, geared, straight side, tie rod.
No. 59½ Toledo, tie rod.
No. 59 Toledo.
No. 56 A Toledo.
No. 55 Consolidated.
Nos. 74½, Bliss straight side.
No. 407-54 Bliss, toggle, double crank, t. r.
No. 14 B Bliss, tie rod, toggle.
No. 105½ Toledo, tie rod, toggle.
No. 34B Bliss toggle.
Nos. 1B, 3½B, 3½C Bliss togglepresses.
No. PA3 Ferracute horning.
75 ton EG51 & E51 Ferracute, knuckle joint.
600 ton American Can, knuckle joint.
150 ton EG52 Ferracute, knuckle joint.
No. 9C Badger State combination punch & shear.
No. 6 Hilles & Jones multiple punch.
Punches & shears, single & double end.
Squaring shears, various sizes.
These and hundreds of others of popular makes and sizes, are in stock at our warehouse here.
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Air compressor, 50 cu. ft., Allis Chalmers, m. d.
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Chucks, 33-6"x9" Heald magnetic.
Chuck, 1-12"x48" Heald magnetic.
Drill, 4 spindle Demco, b. b , p. f. single pulley drive.
Grinder, disc, No. 50 Gardner, m. d.
Grinder, disc, No. 50 Gardner, semi auto., with fixture for grinding edges of electric iron bottoms.
Grinder, disc, No. 14 Gardner.
Grinder, disc, No 126 Gardner.
Grinder, disc, 22" Gardner, m. d.
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Pipe threader, 2" Oster.
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Press, No. P2 Ferracute.
Press No. 65 Consolidated, s. s., flywheel type.
No. 0-36 Unishear, m. d., less motor
Manville four slide, hand feed, cap. ½x1.
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Tappers (two), 5/8" Rickert Schafer.
Thread roller, 3/8 Waterbury.

FOR SALE BY

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Bulldozer, Williams & White No. 4, double end.
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Lathe, 14x6 Monarch, q. c. g.
Punch, Long & Alstatter, 36" throat, 1¾" cap. arch jaw.
Punch, EF Cleveland, 36" throat, 1¾" cap. arch jaw.
Saw, 6" Newton, cold.

S. M. Regar Machinery and Mill Supplies
Tampa, - - - - Florida

Boring mill, Bickford, hor. spd., g. b., tbl. type No 222.
Boring mill, Binsee No. 78 hor. knee type, 3½" spindle.
Boring mill, Niles 36" 2 swivel heads.
Drill, Barnes upright 20" 3 spindle, one tapping att.
Drill, Sigourney 4 spd. also various other upright drills.
Drill, radial, 5' Harrington.
Drill, radial, (one each) 3' and 4' American sens. type.
Drill press, Foote Burt 24", heavy duty.
Hammer, Lingle 50 lb. power, arranged m. d.
Keyseater, Morton 18".
Lathe, New Haven 24", 14' bed. q.c., taper attach.
Lathes, LeBlond 17" & 19" rapid prod. q. c. feeds, (3).
Lathes, National 18" production, (3)
Lathe, Gisholt, 24", hole in spindle 6".
Lathe, Bement Miles, l. c. g., 36" factory raising blocks to 42", centers 17', bed 22'. c. d.
Lathe, Bullard 22" Loose change, turret head.
Lathe, Mueller 20" quick change, 4 way tool post.
Lathe, Jones and Lamson 24"x24".
Miller, No. 2B Hendey Lincoln type.
Miller, Sellers, Lincoln type, pan bed.
Miller, No. 3 Lees-Bradner, thread.
Punch and shear, No. 17, Williams White, combin.

Davis Machinery Company
1-3-5 St. Clair St. Toledo, Ohio

Brake, 4'x3/16" Dreis & Krump, power leaf type.
Brake, 8'x3/16" Dreis & Krump, power leaf type.
Drill, 38" Rockford, b. g. & p. f., motor dr.
Drill, 24" Barnes Camel Back, T. & L., pulley dr.
Gear cutter, 48"x12" Gould & Eberhardt, s.p.d.
Gear cutter, No. 3-36 Brown & Sharpe, s.p.d.
Grinder, 8"x18" Cincinnati pl., motor dr.
Grinder, 12"x12"x40" Thompson hydraulic, m.d.
Keyseater, No. 2 Mitts & Merrill, b.d.
Lathe, 32"x204" Gleason, st. c. gear.
Lathe, 14"x8' LeBlond, q. c. g., taper attach.
Lathe, 42"x16' Bradford, triple geared.
Mill, No. 3 Brown & Sharpe univ., complete, m.d.
Mill, No. 4 Cincinnati high power, plain, b.d.
Mill, No. 5-C Becker-Brainard, univ., b.d.
Mill, No. 14½ Brainard univ., b.d.
Mill, No. 2-Y Brown & Sharpe pl., arr. for m. dr.
Nibbler, No. 103 Gray, cap. 1/8" throat, 36".
Press, No. 90-D Toledo, dbl. crank, m.d.
Radial drill, 4" American, s.p.d., tapping attach.
Shaper, 16" Newark b.g. crank, s.p.d.
Turret lathe, 3x36 J & L sgl. & dbl. head, s.p.d.
Turret lathe, 28" Gisholt, belt dr.

Chas. T. Hamilton Machine Shop
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Drill press, 20 champion upright, m. d., twelve large drills, all new. $275.
Engine lathe, 16"x8' Boye & Emmes, q. c. taper and motor drive, $2900.
Lathe, 16"x6' Hendy, taper and m. d., $1450.
Shaper, 20" Ohio, motor drive, $1450.
Can be seen in operation

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The Nutmeg State Machinery Corp.
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Grinder, Internal, Taylor & Fenn, self contained, complete, Excello spdle.
Grinder, Diamond No. 1 automatic surface, complete.
Grinders, Bryant No. 30, chucking, 35" swing, motor driven by 3 motors, (3).
Grinder, Cincinnati, 12"x36" universal.
Thread millers, Pratt & Whitney 6"x48", complete with gears, pumps, tanks, countershafts, (2).

North Machine Tool Corp.
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CIrcle 5-5191 STillwell 4-1420

Gear generator, 18" Gleason straight bevel.
Gear hobber, No. 00 Pfauter.
Grinders, 10"x24" Landis, direct m.d. plain, cyl.; No. 12 Brown & Sharpe, plain cyl.
Lathes, 18"x6' American arr. for m.d.; 20"x8' Monarch, q. c. g., 14"x6' Hendey yoke head.
Milling machines, 2 B Hendey plain, arranged for m.d.; electr. high speed head; No. 2A Becker vertical, m.d.
Radial drill, 3' Bickford.
Sawing machine, No. 6 Cochrane-Bly, circular saw.
Turret lathe, No. 4 Bardons & Oliver.

Machine Tools Sales Company
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511' 15x9x10 Chi. pneu. O-CB, mtr. dr.
Auto., 3" Model A Cleveland, serial over 30,000.
Bolt cutter, 3" Landis, grd. motor drive.
Crane, 15 ton, 46' span, Niles OET.
Crane, 5 ton, 28' 10" span, Reeper.
Drill, radial, 8' Sellers, m.d.
Grinder, 48"x84" Diamond face, hyd. feed, a. c. m. d.
Grinder, 10"x36" Landis pl. self-cont.
Grinder, No. 2 Landis univ. 12"x32" c-shaft.
Grinder, 7-5/8x16" Sichel, bob.
Lathe, axle, Bridgeford, dbl. end, center dr., q.c.g.
Lathe, 38"x14' centers, Fifield, single back geared.
Lathe, 33"x10' Centers F field, triple geared.
Lathe, 21"x16' Centers Fifield, triple geared.
Lathe, 27"x38' Lodge & Shipley, m d.
Lathe, 25"x14' Bridgeford pl. turn., m. d.
Lathe, 20"x8' Prentice, grd. hd.
Lathes, 20"x6' Springfield mfg., (3).
Lathe, 4"x34" Lo-Swing, q. p. d.
Lathes, No. 2 Warner & Swasey, cone.
Miller, No. 3½, 72" Pratt & W. dble. spdl.
Miller, No. 2 M Potter & J. mfg., s.p.d.
Miller, thd. 11"x24' Milled Screw Co.
Miller, No. 23—6" Smalley, general thread, 6" sp.
Planer, 66"x50"x10' Cincinnati widened pattern.
Planer, 54"x54"x15' 6" Sellers, 3 heads.
36"x36"x14' Hamilton, 3 hds.
Planer, 22' No. 6 Hilles & J. plate.
Punch, No. 6 Hilles & J., 62" throat.
Slotters, 18" Sellers, crank, m. d., (2).
Slotter, 14" Betts, crank.
Slotter, 12" Bement, crank.
Strip mill, 16"x24" 2-hi Duplex, cold.
Strip mill, 16"x24" Bliss 2-hi., cold.
Testing machine, 100,000 lbs Tinius Olsen universal.
Tire setter, No. 6 West hydr., 18 cyl. 30" x 63" with Triplex pump.
Trucks, 6000 lb. cap. Tier Lift Trucks, Baker, Automatic Transportation, Lakewood (3).
Saw, No. 510—42" Newton, cold, m. d.
Saw, 6"x6" Peerless hack.

FOR SALE BY

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Tampa, - - - - Florida

Cyl. grinder, Simplicity, type R, Leland, agl. ph. mr.
Grinder, Brown & Sharpe No. 3.
Grinder, Brown & Sharpe No. 11.
Grinder, Wilmarth & Morman No. 1.
Grinder, Cincinnati No. 1½.
Grinder, Bridgeport surface, 26" wheel.
Grinder, Springfield, double end, heavy duty fdry.

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Air compressors, 139 and 450 cu. ft.
Brake, press, 6'x16 ga. Robinson, toggle.
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Grinder, 12x32" Bath univ.
Grinder, No. 14 Besley double disc, 26" discs.
Hammers, 50 lb. Mayer, 40 lb. Bradley helve.
Lathe, 36"x18' New Haven, plain ch...ng e.
Lathe, 27"x15' Prentice, taper, arr. m. d.
Miller, 30"x10' Newton slab, m. d.
Press, No. 82-C Toledo dbl. crank, 44" wide, 8" shaft, 2" stroke, m. d.
Pump, Goulds centrifugal, 3 stage, 250 g.p.m. against 347' head, m. d., 3-0-3z0 v.
Punch, 48" throat Whiting, 1" thru 1", arch. jaw.
Shaper, 24" Smith & Mills, b.g., crank.
Shaper, 28" American, b. g. crank, cone.
Slotter, 15" Bement, crank, 36" rot. table.
Swaging machine, No. 5 Etna, cap. 3" tubes.

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Wm. C. Johnson & Sons Machy. Co.
1211 Hadley St., St. Louis, Mo.

Air compressors, 15 in stock.
Bolt threaders, 1", 1½" & 2" Acme.
Brake, press, L&N, 10', 10 ga.
Drill, Natco 13 spindle, No. 1 taper.
Drill, No. 2 Fox, 6 spindles.
Drills, radial, Dreses, 3' & 4'.
Drills, radial, Fosdick, 3'.
Drills, radial, Drillmaster, new.
Forging machine, Ajax 2".
Grinders, 10"x3o" Landis.
Grinder, Walker 12" rotary.
Hammers, 300 lb. Beaudry, 75 lb. Bradley, 50 & 100 lb. Little Giant.
Lathes, 14"x6' Monarch, q.c.g.
Lathes, 14"x6' American, q.c.g.
Lathe, 18"x8' Amer. q. c. g.
Lathes, 20x8' Le Blond, q.c.g.
Lathes, 24x16' Lodge & Shipley, q.c.g.
Lathes, 26—48x18' McCabe 2 spindle.
Lathe, 32"x14' Schumacher & Boye.
Lathes, 82" Niles locomotive wheel.
Miller, No. 3 Kempsmith.
Miller, No. 3 Knight vertical.
Miller, No. 0 Steptoe.
Miller, No 3½ Fox.
Pipe machines, 2"—4"—6"—8"—12".
Pipe machine, 2" Landis.
Planer, Cincinnati 2 heads, m. d.
Planer, 48"x48"x12' New Haven.
Potter & Johnson 5 A auto.
Press, wheel, 400 ton 84" Niles.
Press, wheel, 200 ton 48" Niles.
Punches, shears, bulldozers.
Roll, plate straightening, H. & J. No. 2, like new.
Saws, 6x6 Peerless, 12x18 Racine.
Scrap baler Logeman hydraulic.
Shapers, 12"—16"—20"—24".

Large stock guaranteed electric motors. Any size.

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FOR SALE BY

Standard Machinery Co.,
347 Indiana Ave. Grand Rapids, Mich.

Automatic, ⅜" Cleveland, single spindle.
Cut-off, abrasive, Tannewitz type M-2.
Drill, 40" New Haven No. 5, sliding head.
Gear cutters, Whiton No. 14 automatic, (2).
Grinder, cylinder, Heald No. 65.
Keyseater, No. 0 Mitts & Merrill.
Lathes, mfg., 12" x6' Pratt & Whitney, (2).
Lathe, 24"x8' Lodge & Shipley, d.b.g., q.c.g.
Saw, Peerless 6"x6" high speed.
Tapper, Anderson No. 40 Dial Feed Auto.
Welder, Expert Portable spot, 50 KVA.

E. L. Klauber Machinery Co.
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Carburizing furnace, Rotary, Rockwell.
Disc grinder, 18" Besley, motor drive.
Grinders, cutter & tool.
Gear hobber, No. 000 Schuchardt & Schutte.
Lathes, bench precision, ⅜" collet cap.
Lathes, 14"x8', 16"x8', motor drive.
Press, No. 55 Adriance dbl. crank, 5" crankshaft, flywheel type, 2" stroke.
Press, No. 69N Bliss O.B.I., double action.
Shapers, 16" Cincinnati.

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PLANT FOR SALE

25 miles of Detroit, 6000 square feet, 40 employees, mfg. auto parts and tools. Lathes, screw machines, mills, shaper & drills all motor driven (40 machines) Price: building and equipment $35,000.00.

Russell Machine Co.
438 Oliver Bldg. Pittsburgh, Pa.

Bulldozer, No. 2 Wms. & White, m.d.
Gear cutter, spur, 84" Newark, m.d.
Gear planer, bevel, 84" Gleason m.d.
Gear planer, bevel, 36" Gleason, b. d.
Grinder, 14" P&W vert. surface, m.d.
Hammer, 300 lb. Bradley, upright straap.
Lathe, 42"x17'6" Pond, p.c.g., triple grd., b.d.
Lathe, flat turret, 24"x24" J&L, grd. hd., s.p.d.
Miller, univ. No 2-A B&S tbl. 39x84", s.p.d.
Press, hydraulic, 100 ton Watson Stillman, m.d.
Punch, multiple, style "E" L&A 1½" th. cap. 340 tons.
Punch, beam, Cleveland, cap. 24".
Punch & Shear, Cleveland EF 1½" thru 1", b.d.
Punch & Shear, No. 3 H&L dbl. end. 1" thru. 1", m.d.
Shear, Alligator, No. 61 Carlin high knife, 24" sq.
Slotter, 18" Bem. Miles, table 36" dia., b.d.
Shear, No. 4 L&A squaring, cap. 8'x3/16".
Upsetting machines, 2½, 3½, 4 and 5" Ajax iron bed.

West Penn Machinery Company

Air compressors, 30 to 2500 cubic feet.
Baling press, 13-P Logeman, m.d.
Blower, No. 4 Roots, capacity 2110 c. f. m.
Bolt cutter, 1" Acme triple head, m.d.
Bolt cutters, 1½" 2" & 3" Acme, b. d.
Boiler, 45 h. p. Tituaville 110 lb. pressure.
Boring mill, 34" Colburn, turret hd., b. d.
Bulldozers, Nos. 3, 4, 6, 9, 20, & 30.
Crane, 5 ton alliance, 35' span.
Crusher, jaw, No. 4 Champion, b. d.
Die filer, No. 3 Thiel, m. d.
Drill sharpener, Ing.-Rand "Leyner", 1½".
Drill, radial, 5' American, semi-univ., b.d.
Drills, upright 16" to 36".
Drill, No. 216 Baker, No. 5 M. T., b.d.
Engine, gas, 20 horse power Bessemer.
Gear cutters, 11", 18" & 24" Gleason.
Gear tester, bevel 18" Gleason.
Generator, plating 6-v. 3500 amps.
Grinder, disc, 52" horizontal. Gardner.
Grinder, "Kwick-Way" all purpose, m.d.
Grinder, internal, No. 60 Heald, b.d.
Grinder, knife 16' Bridgeport, m.d.
Grinder, roll, Farrel 30"x16".
Grinder, surface vertical, 30" table, 16" wheel, m.d.
Grinder, surface, type B Diamond 24"x13".
Grinder, No. 2 Walker tool & cutter, b.d.
Grinder, No. 2 tool & cutter, Greenfield, b.d.
Grinders, D. E. 7—3 & 5 h. p., 220/3/60
Hammers, 50 lb., 75 lb., 100 lb., 200 lb. Upright.
Hammer, 100 lb. Bradley cushioned helve.
Hammers, Nos. 2-B, 3-B, 4-B, 6-B, Nazel.
Hammers, steam, forging & drop.
Keyseater, No. 1 Davis, 1"x8", m.d.
Keyseater, No. 1 Baker 1½"x12", b.d.
Keyseater, No. 2 Baker, 2"x20", b.d.
Lathes, speed, 11" and 13" Blount, m. d.
Lathe, brass 18x6", friction head, power feed, b. d.
Lathe, 7"x32" P&W, precision, m.d.
Lathe, 16"x12' Rahn-Larmon, geared head, t. a.
Lathe, 18"x12' Hendey, geared head, t. a.
Lathe, 20"x10' Springfield, t. a., m.d
Lathe, 26"x18" Pittburgh, d.b.g., t.a., b.d.

1210 House Building, Pittsburgh, Pa.

Lathe, Lo-Swing, 6"x60", s. p. d.
Lathe, roll, 42"x20' United, m.d.
Lathes, turret, Nos. 1, 2 and 3 W. & S., b. d.
Lathe, turret No. 2½ Garvin, bar feed, b. d.
Lathe, turret, 2 spindle, J&L., 2-7/8", m.d.
Lathe, turret No. 3 D Gisholt, Simplimatic.
Lathe, turret, 7½" Libby, s.p.d.
Locomotive, gas, 6 ton Milwaukee, 36".
Miller, No. 2 Cincinnati universal, b. d.
Miller, shaper, duplex, No. 14 Cochrane-Bly, m.d.
Miller, Lincoln, No. 12 P. & W. 32"x7½", b. d.
Miller, Lincoln, No. 5 Hendey, b.d.
Miller, vertical, Burke, table, 16x6, b. d.
Mixers, Sprout-Waldron, batch & liquid.
Nibbler, No. 1 Campbell 3/16", 6" gap, m. d.
Nibbler, L. & A., ⅜", 36" throat, m.d.
Pipe mche., 3", 4", 6", 8" 12" & 16" Landis-Oster-Williams.
Planer, 30"x30"x10' Gray, 1 head, m.d.
Planer, 39"x36"x12" Cincinnati, 2 hds., b.d.
Press, forging, 150 ton United, steam hyd.
Press, screw, No. 87 Niagara, hand power.
Press, arch, No. 30 Bliss, b.d.
Press, strip feed, No. 31-C McDonald, b.d.
Press, No. 59½ Toledo, 12" stroke.
Press, No. 19 Bliss o.b.i., b.d.
Presses, Stiles, type, 1½ and 3½" m. d.
Pumps, centrifugal 6", 4", 1", motor drive.
Punch, EF Cleveland, 36" throat, 1½" thru 1".
Riveters, air, hammer, spinning.
Saws, friction, Nos. 2, 3 & 4 Ryerson motor drive.
Saw, metal band, Laidlaw, m.d.
Shapers, 16", 20", 24" & 36" Gould & Eberhardt.
Shears, alligator, 1½", 2", 3", 4" & 6".
Shear, Angle 6x6x1 Long & Allstatter, m. d.
Shear, guill, No. 2 H. & J., 24" rd. b. d.
Shear, guill., 4'x4" Newbold, b.d.
Shear, up-cut, 22" Aetna, m. d.
Slotter, 24" vertical, Morton, m.d.
Straightener, 24"x1" Bertch, m.d
Testing machine, 400,000 lb. Riehle, b. d.
Threader ⅜" Geometric, s. p. d.
Tumbling barrel, 34"x48", belt drive.
Upsetters, 1" to 6".

USED AND REBUILT MACHINERY

FOR SALE BY

Failor-Strafer Machinery Co.
132 Liberty St., - - New York, N. Y.

Blue print drying machine, 42" Paragon.
Drill, 1 Avey 3/8 cap. b b., (2).
Grinder, Oliver 4 wheel wood tool grinder.
Grinder, 10"x36" plain cylindrical.
Grinder, No. 3 Brown & Sharpe cutter & reamer.
Keyseater No. 1 Davis.
Lathes, Putnam speed, (3).
Lathe, 32' x12' Putnam, 3 step cone, d.b.g., hvy. duty.
Lathe, 30"x14' Davis, cone drive.
Lathe, 26"x10' Walcott, 3 step cone, d. b. g., hvy. duty.
Lathe, 26"—48"x18' McCabe, two spindle.
Lathe, 16"x5' Sidney, 3 step cone, d.b.g.
Lathe, turret, No. 2A Warner & S., bar equipment.
Miller, No. 2 Shields, high power, single pulley.
Miller, 48" Newton continuous, m.d.
Pipe machine, 6" Jarecki.
Press, No. 74 Bliss, geared trimming.
Press, No. 1 Bliss toggle.
Screw machine, 2" Cleveland Model A.
Tire bender, hand operated.

International Machinery Co.
3131 E. Jefferson Ave., Detroit, Mich.

IMMEDIATE DELIVERY

Automatics, No. 00 Brown & Sharpe, (3).
Automatics, No. 0 Brown & Sharpe, (5).
Automatics, 1½ and 3", 4 spl., cone, b. & m.d., (10).
Brake, 12'-12 ga., Dreis & Krump, power, m.d.
Drill, No. 3 Avey-Matic, p.f., m.d.
Drill, No. 121 Baker, heavy duty.
Drill, 4 spindle Foote-Burt, rail.
Gear shaper, No. 6 Fellows.
Grinder, 16" Persons Arter, rotary, m.d.
Milling machine, No. 1 Kempsmith plain, belt.
Press, 15 ton and 30 ton Lucas, forcing.
Press, 20 Bliss punch, o b i.
Turret lathes, No. 2 Brown & Sharpe, hand, (3).
Turret lathes, No. 2 Foster, hand, (3).
No. 1 Warner & Swasey.

The Reeve-Fritts Company
28 N. Clinton St., Chicago

Broach, No. 3 horiz., belt drive.
Hammer, 100 lb. Little Giant upright.
Lathe, 20"x8' Flather, p.c.g.
Pipe mach., 2 spdl. Murchey, 2" cap.
Hack saw, 6"x6" Marvel, h.s.

Nesbitt Machinery Co.
110 E. Pratt St., - Baltimore, Md.

Planer, 22' plate, motor drive.
Guillotine shear, 6"x6" cap. Hilles & Jones.

D. E. Dony Machinery Co.
47 Laurelton Rd., - Rochester, N. Y.

Drill, 4-spindle, Demco 12" overhang, m.d.
Gas cutting machine, No. 7 Oxygraph.
Lathe, 16"x8' Illinois.
Press, No. 73 Bliss, s. s geared.

FOR SALE — GOOD TOOLS

Boring Mill, 42" Bullard, New Era, Motor Drive ..... **$9,000.**
Auto. Cleveland, ½" Model "A", B. D. ..... **$750.**
Auto. Cleveland, 2½" Model "A", B. D. ..... **$3000.**
Auto. Gridley, 7/8" Model F, 4 Spindle, M.D. ..... **$2000.**
Drill, Automatic, Sensitive, with motor, hi. spd., cap., 3/16" ..... **$150.**
Drill, 2 spd. Allen H. S. B. B. 14" Swing, No. 2 M. T. ..... **$300.**
Drill, Foote Burt No. 24, 24" Heavy Duty ..... **$1000.**
Drill, 2 spd., Colburn, No. 2 Mig., Motor Driven ..... **$2150.**
Radial Drill, 2' Fosdick, M.D. 220/60/3 ..... **$750.**
Radial Drill, No. 7, 4' Prentice M. D. 220/60/3 ..... **$1500.**
Gear Cutter, No. 6 B. & S., Cap. 60"x11" ..... **$3500.**
Grinder, Landis, 12"x36 with Motors ..... **$4000.**
Grinder, 12"x24" Plain B.D. No Name. **$250.**
Grinder, 16"x96" Safety, M.D. 26" Wheel ..... **$4500.**
Lathe, 12"x5' Hendey, Q.C., Taper. **$1500.**
Lathe, 14x6 Carrol Jamieson, Q. C... **$600.**
Lathe, Monarch, 14"x10' QC with 4 jaw chuck ..... **$1150.**
Lathe, 16-18"x11' Lehman, Q.C. Taper ..... **$1750.**
Lathe, 18-20"x12' L. & S., Q.C. M. D. ..... **$2250.**
Planer, 36"x36"x12' Woodward-Powel, 2 Heads, with Motor ..... **$2500.**
Press, No. 126 Max Ams O.B.I. 1" str. **$325.**
Saw, No. 8 Marvel, Band, M.D..... **$800.**
Turret Lathe, 2x24 J & L, Geared Head and Feeds ..... **$1150.**
Turret Lathe, 2-½"x26" P & W for chuck or bar work ..... **$2150.**
Threader, Namco, 2-sp., ¾" Cap..... **$200.**
Miller, No. 2, Craftsman Rotary **$750**

BANSBACH MACHINERY CORP.
3845 West Madison Street, Chicago
Kedzie 0212

Immediate Delivery

One—6' Bar Capacity Gisholt Turret Lathe, power feeds to turret and cross slide, T. A., 3 jaw chuck.
Four—2' Cleveland S. S. Model A Chucking Machines.
One—⅞' Model A Cleveland S. S. Bar Automatic Screw Machine.
One—30' Norton Lapping Machine, M. D.
Two—No. 3 Neilson Automatic Chain Machines.

For further information, write

Austin D. Lucas and Co.
358 Bishop Ave., Bridgeport, Conn.

USED AND REBUILT MACHINERY

FOR SALE BY

Rollman Mfg. Co., - Mount Joy, Pa.

Automatic screw, turret lathes, Bliss presses, shaper, milling and other machinery Write for complete descriptive list of 70 used machines for sale.

Woodworkers Tool Works
220 S. Jefferson St., Chicago, Ill.

Grinder, Covel-Hanchett, automatic, for circular metal saws 8" to 84" diameter, index feed, b. d. .....$350. F.O.B. Chicago.
Lathes, Patternmakers.

Under Writers Fire Pump
18-10-12-1000 gal. per minute. Steam driven.
Made by Buffalo Steam Pump Co.

MORRIS MACHINERY CO.
Newark, N. J.

WANTED
SCREW MACHINES

Any Make or Model
In Any Condition

MODERN COLLET & MACHINE CO.
401 Salliotte St. Ecorse, Michigan

WILL SELL
SCREW MACHINE PRODUCTS AND MFG. BUSINESS

14 Brown & Sharpe automatic screw machines, with outside feeding and screw slotting attachments, plenty of tool holders, collets, feed pushers and other miscellaneous accessories.

Other equipment consists of hand screw machines, drill presses, milling machines, etc.

Items with merit for manufacturing, suitable for defense and non-defense now being manufactured and sold.

GREAT LAKES METAL SPEC. & MFG. CO.
1450 W. NORTH AVE., CHICAGO, ILL.

SPECIAL—For Deep Drawing of Shells

No. 857 Toledo Rack & Pinion Press, Stroke vari. 5 to 40", area of bed 25x25", weight 22000 lbs., very good condition.

Wm. C. Johnson & Sons Machinery Co.
1211 Hadley St. St. Louis, Mo.

FOR SALE
IMMEDIATE DELIVERY
HEAT TREATING EQUIPMENT
(NEW) Never Used

1—Salt Bath Tank (12'-0" long, 4'-3" deep, 4'-7" wide) complete with electrical equipment, capacity 100 KW. 3P. 60C. 220V. 12 electrical heating units rated 8.3 KW 220 V. 60 C. for salt bath application. G.E. control panel capacity 105 KW's. 220V 3P. 60C. arranged for 220V. 60C. control circuit, with Y-Delta switch for ⅓ heat and full heat. Trumbull control switch, Leeds-Northrup Model 4061 1 strip chart indicating and recording controller range 1200 degree F. and transformer for 220V. alternating current.

Delaware Machinery Corporation
1790 BROADWAY TEL. CIRCLE 5 5191 NEW YORK, N. Y.

3' Morris Radial Drill, gear box.
No. 6 W. & S. Turret Lathe, GFH
14"x6' Hendey Lathes, T.A., compl. (2)
No. 3 Foster Turret Lathe, GFH
No. 3 Owen Universal Mill
9" Sundstrand Mfg. Lathe
No. 4 B. & O. Turret Lathe, GFH
20" Grob Bandsaw, M.D.

BARRON MACHINERY COMPANY
563 W. WASHINGTON ST. CHICAGO, ILLINOIS

For Sale

A number of turret feed cams ranging from 6 inches to nine inches, 25° to 45° angle.

Turret cams 45° to 60° angle.

Die starting cams.

The above are for single spindle Gridley Automatics.

Pittsburgh DuBois Company
DuBois, Pennsylvania

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TAPS-TWIST DRILLS-FILES
CUTTERS-ENDMILLS-SAWS
HACK SAW BLADES

WE WILL BUY YOUR SURPLUS TOOLS

WESTERN TOOL EXCHANGE
619 W. Randolph St., Chicago, Illinois
SURPLUS BOUGHT AND SOLD

FOR SALE

Lathe, Fay-Scott 32"x14', 2 chucks, 5 H.P. motor.....$1475.

Lathe, Porter 24"x18', dbl back gd. 2-6 station turrets, 14 jaw chuck, 2 face plts....$1375.

Lathe, Walcott 44"x16' Standard engine type 5 H.P. motor.....$1275.

Planer, American Foundry & Machine Co., 36"x36"x12' openside 10 H.P. mtr. $5850.

Vertical Boring Machine, Pond 80" Good shape, 4 Mill jaws.....$8750.

MACHINERY SALES CO.
3838 Santa Fe Ave., Los Angeles Calif.

NEW INDEPENDENT LATHE CHUCKS
IMMEDIATE DELIVERY

		NET PRICE
18"—4 Jaw	Independent Chucks	$ 98.00
20"—4 Jaw	Independent Chucks	112.00
24"—4 Jaw	Independent Chucks	146.00
28"—4 Jaw	Independent Chucks	160.00
32"—4 Jaw	Independent Chucks	225.00
36"—4 Jaw	Independent Chucks	275.00

James W. George Machinery Co.
3146 E. Jefferson Ave., Detroit, Mich.

FOR SALE

Acme No. 55, 4 spindle, 1⅝ hole, collets, cams, fingers, bar feed—$1500.

Lodge & Shipley 14"x6' Q. C. Lathe, with 2 H.P. Lima Gear Shift Drive (new)—$750.

Potter & Johnson, prod. chucking lathe, power feed, bar feed, 1½" hole, oil pan, with Lima Gear Shift Drive (new)—$950.

Paterson Machine Tool Exchange
442 Main Street Paterson, N. J.

SELLING FOR CUSTOMER
CAN BE SEEN IN OPERATION

Grinder, No. 2 Landis Univ., 12"x32", B. D. .....$3500.

Grinder, Brown & Sharpe, No. 12, 8x36, belt drive .....$2000.

Grinder, Landis 16x66, crankshaft, belt and motor drive, serial 21513.$3000.

Grinder, Heald No. 65, cylinder with small spindle for internal grinding, motor driven, serial 586 .....$1500.

Lathe, Willard 13x6, SQC with chuck, belt drive .....$425.

Lathe, Hendey 19x8, QC with taper attachment .....$1800.

Lathe, Monarch, 20x8, QC, 14" chuck $2000

Lathe, Lodge & Shipley, 22x14, patent head, QC, DC motor drive.....$1500.

Lathe, Draper 20x12, plain change, taper attachment .....$350.

Planer, Lodge & Davis, 24x6, 1 head, belt drive .....$1000.

Planer, Whitcomb 18x5, 1 head, arranged motor drive .....$450.

Miller, No. 2 Cincinnati Geared Head Full Universal with slotting attachment.$6450.

Honing Machine, Hutto, 8' radial arm, motor drive .....$2000.

Press, Hydraulic, Hannifin, 20 ton arbor, C frame, motor drive complete....$450.

Drill, New Albany Tool Room, friction type ½" cap. .....$100.

BANSBACH MACHINERY CORP.
3845 W. Madison St., Chicago, Ill.
Tel. KED. 0212

60" wide x 11' Planer

L. W. Pond Machine Co., Worcester, Mass. manufacturer — size 60" wide x 11'; has two heads; is in first-class operating condition and can be seen in operation.

WILLIAM H. FIELD COMPANY
323 Dorchester Ave., Boston, Mass.

FOR IMMEDIATE DELIVERY
ALL REBUILT AND MOTORIZED

Ferracute power punch press.
Hydraulic Presses 300, 175, 50 ton.
Punch Presses 14, 10 ton.
Power Shears, Niagara 8', 3 H-P.
Squaring shear 52".
Foot Shears 8'x22".
Bending Brakes 96", 72".
Woodworking bandsaw, circular saw.
Jointer, 12".

DELAWARE MACHINERY CORPORATION
1790 BROADWAY TEL. CIRCLE 5-5191 NEW YORK, N. Y.

IN STOCK FOR IMMEDIATE DELIVERY

AUTOMATICS

1—¾" cap Acme 4 spd. M.D.
1—4 spd. Grid. 1¼" cap. M.D.
2—Model A Clevel. ⅜" cap.

BORING MILLS—Vertical

42" Bullard M.D. 1 Pl. hd. and 1T Hd.
48" Niles Bement & Pond Car Wheel Borer M.D.

BORING MILLS—Horizontal

3½" bar D&H Floor Type M.D.

DRILLS

3½' Bickford Un.
2 and 4 spd. Henry & Wright
4 spd. Demco P.F. to spd.
24 [illegible] Camel back M.D.
4—22" Barnes P.F. M.D.
36" Cinc. Bickford sld. hd.
36" Aurora Sl. Hd.
36" Superior Sld. Hd.
4 Spd. Barnes No. 4 Taper, 82"x17" Tbl p.f. to spd. m.d.
1—16 spd. Bosch M.D. oil grooved 54"x30" rect. head, No. 3 Morse Taper
2 spd. Webster & Perks Horz. Tapper
1—2X Garvin Automatic Tapp.
4—Langelier Bench High Spd.
1—Demco S.S. High Speed

GEAR MACHINERY

Whitton automatic Gear Cutter Spur & Bevel
1—3-26" B&S Auto. gear Cut.

GRINDERS

1—6x32" Norton Pl.
1—14x50 Lea Mt. Dr. 3 mts Un.
1—No. 1 Wilmarth & Marmon Un T&C
10x48 No. 14 B&S Pl.
8x36 Fitchburgh Pl.
3—No. 3 B&S Tool and Cutter
12x36 Landis Un.
2—No. 1 Fraser Un.
1—No. 2 Oakley Un.
1—No. 3 Diamond Surf. M.D.

LATHES

3—12x5 Cleveland G. Hd. Taper attach.
14x8 American C.P.D.
10x8 Flather M.D.
17x8 South Bend C.P.D.
14x6 LeB., 3 stepconeD.B.G.
18x10 S. Bend C.P.D.
2—18x8 Mueller, 3 step.D.B.G.
2—18x8 Morris, 3 step. D.B.G.
24x12 Shoemaker & B. D.B.G.
32x20 New Haven
50x24 Fifield Triple geared
4x60 Fitchburg low swing—new condition
42x26 Bement Triple geared
18x10 Monarch, 3 step. D.B.G.
12x5 Hendey Yoke hd. Tap.at.

PLANERS

56x56x11' Gray rev. M.D. 2 rail hd. 2 side heads
30x30x8' New Haven
26x26x7' Gould & Eberhardt
22x22x4' Hendey

TURRET LATHES

No. 0 Bardons and Oliver
4" Conradson Un.
No. 6 Brown and Sharpe

MILLERS

No. 1B. Milwaukee Double overarm rack cutting attach.
No. 0 Van Norman hand
Hendey & Becker Lincoln Typ.
AB Becker Vert. Rotary Table, new condition
2—No. 3 1/3 Fox Plain
No. 3 Lees Bradner Thrd. Mil.
Holden—Morgan thread
No. 2 A-B&S. M.D. Vert. Hd.

PRESSES

Bliss Incl. G. mt. Dr.
2—No. 2 Standard O.B.I
2—No. 18 Bliss O.B.I.
2—19½ Bliss O.B.I.
4¾ Michigan O.B.I.
Ferracute Bench O.BI.
92C Toledo Gd. Mt. dr. steel Tie Rod
Toledo Arch G.M.D.
No. 37 Niagara back Flywheel M.D.
No. 6 Stiles & Parker geared
No. CG 14 Ferracute O.B.I. Automatic roll fd.

SHAPERS

20" Steptoe C.P.D.
26" Kelly M.D.
24' Milwaukee C.P.D.

WELDERS

50 KW. Thompson Spot Aut.
3 K.W. Thompson Spot. Aut.

PIPE MACHINES

10" Cox
023 A Oster 6" Capacity
10" Bignall and Keeler M.D.
6" Stover M.D.
Acme & L. Bolt Thrd. Mchs.

SAWS

3" Burr Cold
No. 12 Higley Cold
No. 3 Klemm Metal Band Saw

MISCELLANEOUS

6'x10 ga. D&K Leaf Type Brk.
3—Grant Spinners
3A High Speed Hammer
Morton Keyseater 4" cap.
No. 0-2-3 LaPointe Broaches
2—Product-O-Matics
1—No. 1 Gray Nibbler Turret Type
8—Double leg Steam Forging Hammers 3000 lb. to 1000 lb.
6" Pilton Slotter
7" Rhodes M.D.

NESBITT MACHINERY CO.

110 E. PRATT STREET, BALTIMORE, MD.

CONSIDER GOOD USED EQUIPMENT FIRST!

IMMEDIATE AVAILABILITY AND DELIVERY ARE IMPORTANT FACTORS

AIR COMPRESSOR
1145 cu. ft. 20" x 12" x 14" Chicago Pneumatic Type O-CBB M. D. with 205 H. P. G. E. Motor. 100 lb. Pressure

BORING MILL—HORIZ.
5" Bar P & H Boring, Drilling & Milling Machine, Arr. M.D.

BUILDINGS
48'x160' Steel Building built by Wisconsin Bridge & Iron Co. Heavy Construction
75'x247' Steel Building, Heavy Construction
80'x400' Steel Building

BULLDOZER
No. 7 Ajax Motor Drive. Face of Crosshead 12"x76" Stroke 16"
No. 8 W & W Motor Drive. Face of Crosshead 20½" x 108", Stroke 24"

CRANES—OVERHEAD ELECTRIC TRAVELING
3 ton P & H 16'9" Span 220 Volt D. C.
10 ton Alliance 32'3¼" Span 220/3/60 A. C.
10 ton Whiting 30' Span 220/3/60
15 ton Niles 48'11-¼" Span 220/3/60 A. C. Including Phase Changer
50 ton Niles 30'6" Span 220/3/60 A. C. 5 ton Auxiliary

CRANE BRIDGES
10 ton P & H 26' Span
10 ton P & H 39'11" Span
15 ton Alliance 42'6" Span
40 ton P & H Type 60' Span All complete with End Trucks

CRANE—GANTRY
10 ton McMyler Interstate Gantry Crane, 95' Span. 220 Volt 3 Phase 60 Cycle Motors

DRILL—RADIAL
4' Morris Plain Radial Drill. 12" dia. Column

FORGING MACHINES
¾" to 6" Ajax, Nat Acme, St. Fr.

HAMMERS—BOARD DROP—STEAM DROP-STEAM FORG.
1000 lb. to 8000 lb. Chamb. B. & Sp. Erie. N-B-P Morgan

LATHE
42" x 28' Wickes Heavy Duty Screw Cutting Engine Lathe. M. D.

LEVELLERS—ROLLER
50" McKay Motor Driven 17 Rolls 4½" Dia.
75" Torrington. 19 Rolls, 2" dia., Arr. for M. D.

MILLING MACHINE—PLANER TYPE
42"x42"x16' Ingersoll Single Face Adj. Rail Planer Type. B. D.

PRESS—DOUBLE ACTING TOGGLE
No. 162 Toledo Punch Press. Bed Area 21" x 21". Stroke of Blankholder 5". stroke of Plunger 8½"
No. 408-A Bliss Double Crank, Bed Area 72"x50", Stroke 15"

PRESSES—SINGLE ACTING—STRAIGHT SIDE
No. 10-C Bliss 6" Stroke 84" between Uprights

8000 lb. MORGAN STEAM FORGING HAMMER
Double Leg

No. 98F TOLEDO DOUBLE CRANK PRESS
124" Between Uprights
12" Stroke
Tie Rod Construction
Complete with 40 H.P. Motor

No. 32 Williams & White Multiple Punch & Shear
Motor Driven
Including 20 HP A.C. Motor
Punch Cap. 350 tons Pressure
Shear Cap. 10' of ¼" Plate
101" Between Housing
8" Diameter Shaft
Shearing Attachments Available, Including Blades for Converting this machine into a Gate Shear

No. 6 Cleveland Multiple Punch & Shear
Motor Driven
11'4" Between Housing
12" Shaft Diameter
Punch Capacity 750 ton Pressure
Shear Capacity 11' of ¼" Plate
Punch Holder Dies for Multiple Punching and Attachments for Converting to shear included

2,000,000 lb. Tinius Olsen Horizontal Compression Testing Machine
Complete with Pump and Motor

232,000 lb. Tinius Olsen Torsion Testing Machine
Motor Driven
Capacity for Testing Rounds up to 2¼" dia.

IZOD Impact Testing Machine

PUNCH AND SHEAR COMBINATIONS
No. 2 Hilles & Jones Double End Punch & Shear, M.D., 25" throat. Cap. to punch 1" thru 1", shear 6"x1"
No. 12 Williams & White Combination Punch & Shear, Motor Driven, 42" Throat. Now rigged for 6" angles and multiple punching, rated punching capacity 2½"x1¼"
No. 13 Williams & White Double End Punch & Shear, M.D., 29" Throat. Cap. punch 1¾" thru 1", shear 2½" rounds
No. 1 Long & Allstatter Single End Punch and Shear, Belt Drive, 24" Throat. Capacity 1" thru 1", shear 2½" rounds
No. 14 Williams & White Single End Punch and Shear, Motor Driven. 48" Throat. Capacity Punch 1¼" thru 1". Equipped for gag punching
No. 3 Hilles & Jones Single End Punch, Motor driven. 12" Thr. Capacity punch ¾" thru 1¼". Equipped for Multiple Punch.

ROLLING MILLS
9"x18" Farrel Rod Rolling Mill, 3 High
10"x16" United E&F Co. Single Stand Two High
12"x15" Mackintosh Single Stand Two High
12"x20" Philadelphia Single Stand Two High, Complete with Coiler & all operating equipment
16"x10" Waterbury Four Stand 2 High
16"x20" Waterbury Farrel Single Stand Two High
16½x22" Cold Strip Mill 2 stand 2 high
18"x36" Farrel Birmingham Single Stand 2 High
24" Mackintosh Bar Mill 2 stand 3 high

ROLLS—TAPER FORGING
No. 1 Ajax Taper Forging Roll, B. D.
No. 3 Ajax Taper Forging Roll, B. D.

SHEAR—ANGLE
4"x4"x½" Long & Allstatter Dbl. Angle Shear, Arranged for MD.

SHEARS—BAR
Garrison Guillotine Type Bar Shear, Arr. Motor Drive. Capacity 15"x2½"
No. 6 Buffalo Armor Plate Bar Shear. Arr. for B.D. Cap. 1-5/16" square 1¾" round

SHEAR—ROTARY
Newbold Rotary Shear, Arr. for M.D. Cap. ¾" mild steel plates

STRAIGHTENERS
Shuster Shape Straightening Machine. M.D. Cap. ¾" Hexagons
No. O Medart Straightener, Arr. for M.D. Cap. ¼"x1½" dia. inclusive, any length.
No. 3 Sutton Two Way Flat & Shape Straightener Arr. for M.D. Cap. 1-1/16"x11/16" or 1¼"x13/16" Flats, etc.

Entire Surplus Manufacturing Equipment Inventories Purchased. Appraisals. Liquidations. Consulting Engineering Service.

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NEW YORK **30 CHURCH ST.** **PH. CORTLAND 7-3437-3438**
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AVAILABL E!!

REBUILT MACHINES IN STOCK

16"x6' Hendey Q.C.G. Engine Lathe, yoke head type with chuck, taper, pan bed
No. 1 Cincinnati Univ. Mill M.D.
No. 1½ Brown & Sharpe Univ. Mill
No. 2 Owens Univ. Mill M.D.
No. 2½ LeBlond Heavy Duty Univ. Mill M.D.
No. 3 Cincinnati Plain Mill M.D. with Halco Hi-Speed Vert. Head
No. 310 Baker H.D. Drill S.P.D.
6"x15" Fitchburg Plain Cyl. Grinder. Belt drive. Can be motorized
No. 60 Heald Internal Cyl. Grinder
V-20-12 ton American Vert. Brch.
No. 19—53" Besley Vert. Spdle. Disc Grinder

OTHER MACHINES IN STOCK

MILLS

2-No. 24 Bliss Vertical Die Sinkers with long power feed to 24" dia. rotary table. Can be used as vertical Mills Fine Condition
2-No. 2 P. & W. Vert. Die Sinkers
18" Cincinnati Automatic
2A-Becker Vertical—Rotary table
No. 5 Becker Vert.—Extra long table
No. 3 Hendey Norton Plain with Heavy Dividing head & tailstock. Feeds in all directions M.D.
No. 5B Becker Horiz. Plain
No. 3 Knight Vertical M.D.
60" Niles Vert. Bor. Prod type 2 hds

DRILLS

4' Niles Bement Pond Full Univ. Radial No. 4 M.T.—4 speed AC MD. with M & Controller—Box Table 11" Col. Rev. Spdl.
2½'—3'—4' Plain Radials M.D.
5 & 6 Spdl. Moline Hole Hogs No. 3
1-2-4 Spindle L & G—H & W Sens.
4 Spdl. H.D. Foote-Burt Reaming Machine No. 5 M.T.—M.D.

LATHES

12"x5' Hendey—Taper—Chuck
12"x6' Carroll Jamieson—2 chucks
16"x6' American—Taper—2 chucks
18"x8' Rockford—Taper—M.D.
18"x8' American—Chuck
20"x10' Schumacher-Boye—Taper
26"x16' Bridgef. & Gleason—Tapers

GRINDERS

Capitol Internal—M.D.
2-No. 6 Bryant Internal—Extra spdl.
No. 18 Bryant Internal
2-36" Bath Univ. Head and Tailstock
1-Modern Plunge Cut Form Cyl. Live centers—Hopper feed. Never used M.D.
6"x18" Landis Plain—S.P.D.
10"x50" Norton Plain—Model B M.D. Del. in 30 days
No. 3 Diamond Surface—48" travel
10"x36" Landis Plain M.D.

MISCELLANEOUS

3-No. 12 Barber Colman Gear Hobs.
½" National Bent Tapper
12"—14" Bement & Sellers Vert. Slotters
No. 7 Foster Turret Lathe—Power cross feed and tools
9"x9" Peerless Shaping Saw M.D.
3 ton Automatic Hi-Lift Truck with rebuilt Ready Power Unit
2—4 way Natco Multi Spindle Drills 2 heads opposed—1 at rear—1 vertical — 34 spindles No. 1 Morse taper—4 motors & controls
Taylor Winfield Butt Welders—Like new. 20 KVA—M.D.
36"x36"x8' Detrick & Harvey Open-side Planer—2 Rail Heads, 1 Side Head. Self-contained M.D.
4-No. 7 L S Fellows Gear Lappers, M.D. like new
Model D Hall Planetary Mill
1¼" and 2 3/16" Mod. A Clev. Auto.
2—4 way Natco Mult. Spindle Tappers—2 heads opposed—1 at rear—1 vertical—34 spindles—motors and controls
Marquette Type EEL—206 Double Die Cushion—30"x60" ASME tank, pressure gauge, safety valve & ¾" Mason Regulator

Our Engineering Service will aid in the Selection of Good Used Production Machines we have available.

A Well Managed and equipped Department for the Reconstruction of Machine Tools is at your Service.

R. A. VINE'S MACHINERY WAREHOUSE

652 West Willis Avenue **Detroit, Michigan**

DEPENDABLE—"FALK"
QUALITY — DELIVERY — PRICE

No. 3V GALLMEYER & LIVINGSTON "New" HYDRAULIC SURFACE GRINDER
Motor Drive

LATHES
42" x 25' Pond Heavy Triple Grd., belt dr.
27" x 20' Lodge & Shipley, Patent Head
26"x16' Greaves Klusman, Pl. Change with Raising Blocks to swing 48"
26"x12' Crawford Erie Heavy Duty Lathe, quick chg. gr.
25"x12' LeBlond Heavy Duty, Taper Attach.
20"x8' American, Q.C.G. M.D.
20x10 Davis, QCG., cone drive
21"x8' LeBlond, tur. on car.
18"x12' Prentice, cone
18"x12' Hamilton, cone
18"x8' LeBlond Product. QCG.
18"x8' Mueller, QCG, cone
18"x8' Chard cone
18"x8' Cisco, QCG., cone
17x8' Sidney
16x8' Cincinnati, QCG., cone
16x8' Cincinnati, QCG., taper
16x6' Lodge & Ship. Grd. Hd.
16x6' American Geared Head
16x6' Pratt & Whitney cone
16x6' Monarch, QCG., cone
16x6' Lodge & Shipley, QCG., cone
14x6' Rockford, QCG., cone
14x6' Standard Lathe Works, Pl. cone
14x6' Monarch, QCG., cone
13x6' Pratt & Whitney Model "B" gagemaker
13x5' Mulliner, QCG., cone
13x5' Mulliner, QCG., taper, dr. bar
4"x104" L-swing, 4"x60", 4"x48"
10"x42" Logan (new)

HORIZ. BORING MILLS
No. 0 GIDDINGS & LEWIS 3" bar
No. 32 GIDDINGS & LEWIS 3-½" bar (2)
4" LAMBERT-HILL CLUTCH COMPANY

RADIAL DRILLS
6' American, 15" column
5' Fosdick, Univ.
4' N.B.P. Semi-Univ., 11' col.
3' Bickford, 9" column
3' Carlton, Sensitive, BB.; MD.
3' American, Sensitive

DIE CASTING MACHINES
3—Madison-Kipp 500 lb. pressure; Gooseneck No. 5; sizes; 10x12; 12x14; 12x16. Late models—Bargains

FORGING PRESS
No. 4 BLISS, with taper rolls

VERTICAL BORING MILLS
62" NILES
42" COLBURN

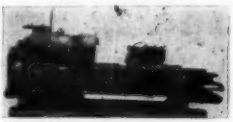
LARGE PLAIN MILLER
No. 4 LeBlond—Heavy. Motorized Gear Box Dr. Perfect Condition

No. 1½ B & S Plain
No. 1½ Cincinnati Plain
No. 1½ Van Norman
No. 0 Van Norman (2)
No. 12 B & S, Production Mill
No. 4 Hendey Plain
No. 1A Gooley & Edlund

PLANERS
42"x36"x12' Cincinnati
24"x24"x8' Whitcomb-Blaisdell
20"x20"x24' N.B.P. Pl.- Shaper

SHAPERS
14" Gould & Eberhardt
15" Potter & Johnston
16" Smith & Mills
16" Stockbridge
17" Smith & Mills
20" Ohio
20" American
20" Cincinnati
24" Gould & Eberhardt, cone
24" Gould & Eberh., Gear Box
28" Gould & Eberh. "Invin."
24" Stockbridge
25" Cincinnati

TURRET LATHES
LIBBY 26"x7½"



PRESSES
No. 18 Bliss, OBI
No. 19 Bliss, OBI (3)
No. 19C Bliss, OBI
No. 20 Bliss, OBI (10)
No. 22B Bliss, OBI
No. 21 Bliss, OBI
No. 21½ Bliss Grd., OBI
No. 75 Toledo Plain
No. 75 Toledo Geared
No. 3 Consolidated
No. 14 Stoll
No. 3 American Can Co. OBI
No. 3 Adriance
No. 37½ Bliss S.S. Plain
No. 5 American, S.S. Tie Rd.
No. 3R Marquette Grd.; M.D.
No. 702 Bliss Flat Trimming
No. 4 Bliss, Back Flywheel
No. 50 Perkins Dbl. Crank Pl.
No. 4 Baxendale (3) OBI
No. 6 Waterbury
No. 77½ Bliss S.S., Dbl. Grd. Tie-rod; dbl. acting belt dr.
No. 59 Toledo S.S. Tie-rod 8"
No. 25 Stoll Horn Press
No. 301S Bliss Auto. Gang Pr.
25-ton Henry & Wright
No. 93D Toledo S.S. Solid Fr. Dbl. crank; 4" stroke; grd.
No. 166 Consolidated

MISCELLANEOUS
No. 4 W-W Bulldozer
Riveting High Speed Hammers in all sizes
Paper Cutter 42" ACME
Motors and Generators

6x14 PRATT & WHITNEY THREAD MILLER

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All Sizes—Plain and Swivel

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EMCO REBUILT

MANUFACTURING LATHES

8x60" Lo Swing, m.d., hardened ways, 1 carriage (2)
8x60" Lo Swing, m.d., hardened ways, 2 carriages
8x36" Lo Swing, s.p.d., 1 carriage
3x80" Lo Swing, s.p.d., 2 carriages
12"x5' Sebastian, s.p.d.
16"x6' Rockford, cone
18"x8' Chard, cone
20' x8' American Turret, cone
28"x10' American Turning, cone
30" Streit Pulley Turning, cone
Niles-Bement-P. Quarter. Mch., m.d., new
11"x4' Wells Speed, cone
15"x6' Automatic Threading, cone
Niles-Bement-Pond Axle, cone
N.-B.-P. Center Drive Car Wheel, md., new

TURRET LATHES AND SCREW MACHINES

No. 1L Gisholt, m.d., hardened ways
No. 0 Brown & Sharpe Hand, cone
No. 3 Foster, cone, Timken
No. 4 Bardons & Oliver, cone
No. 4 Foster, cone
No. 6 Brown & Sharpe Hand, cone
2¼x24" Jones & Lamson, m.d., bar
3¼x36" Acme Geared Head, bar
2¼x24" Jones & Lamson Steel Head, bar
3x36" Jones & Lamson, m.d., chucking
3x36" Jones & Lamson, m.d., bar
3x36" Jones & Lamson 2 spdl., m.d., chk.
3¼x40" Greenlee Flat Turret, cone, bar
18" Acme, cone chucking
21", 24" Gisholt, cone, chucking
24" Gisholt, m.d., chucking
28" Libby Type C, m.d., 7½" hole, chuck.

SHAPERS

24" Cincinnati, gear box
24" Queen City, cone
24" Smith & Mills, belt

SLOTTERS

84" Newton, m.d.

BOLT THREADING MACHINES

No. 11S Rickert-Shafer Auto. Thread., m.d.
9/16" Landis 2 spindle, m.d.
1" Acme 2 spindle, cone
1" Acme 3 spindle, cone
1" Landis, cone
1½" Landis 2 spindle, m.d.
1½" Landis, cone
2½" Acme, cone
American Bolt Heading Machine, belt

GEARED HEAD ENGINE LATHES

16"x7' Cisco
20"x14' Hendey, taper
22"x16' American 100 H.P. Input Super Lathe—16' centers—22' bed, 6 motors
24"x8'6" Bridgeford
24"x18' Lodge & Shipley, taper
26"x16' Bradford, taper
26"x16' Bridgeford, taper
26"x18' Bridgeford, taper
27"x21'9" Bridgeford, taper

CONE HEAD ENGINE LATHES

11"x5' South Bend
14"x6' Bradford, collet attach.
15"x6' Willard
16"x6' Bradford
16"x6' Pratt & Whitney
16"x8' Bradford
16"x8' Cincinnati
18"x6' Bradford
18"x8' Bradford
18"x8' Mueller, taper
18"x10' Springfield
18"x12' Barker
18"x12' Monarch, taper
18"x14' LeBlond, taper
19"x8' LeBlond, taper
19"x12' LeBlond, taper
20"x10' Davis
20"x10' Lodge & Shipley
21"x8' LeBlond, taper
21"x10' LeBlond, taper
21"x16' LeBlond, taper
22"x12' Greaves-Klusman
22"x18' Niles
24"x10' Canada
24"x10' Bridgeford
24"x10' LeBlond
24"x10 Whitcomb-Blaisdell, taper
24"x11' Chard
24"x16' Schumacher-Boye
24-48"x16' McCabe 2 in 1
26"x18' Schumacher-Boye, taper
30"x14' Hamilton
30"x20' Schumacher-Boye, taper

MILLING MACHINES

11"x4' Hanson-Whitney Thread, m.d.
Carter & Hakes Mfg., belt
No. 2 Garvin Lincoln Type, belt
Gooley & Edlund Briggs Type, belt
Putnam Briggs Type, belt
30"x28"x8' Ingersoll Planer Type, m.d., 4 heads
Newton C17 Vertical Slab, m.d.
40" Ohio Tilted Rotary, m.d.
48" Oesterlein Tilted Offset, m.d., Timken Bearings
C66A Newton 3 spindle Continuous, s.p.d.
No. 2 Pratt & Whitney Hand, cone

GEAR MACHINERY

6" Gleason Straight Bevel, s.p.d. (3)
16" Cincinnati Hobber, m.d.
18" Gleason Straight Bevel, s.p.d.
Gleason Spiral Bevel Gear Rougher, s.p.d.
16" Gould & Eberhardt Gear Cutter, belt
Whiton No. 1—26" Full Universal Spur & Bevel, belt
No. 3-26, 3-36, 3 Heavy, 4-36, 4-48, 6-60, 6-72" Brown & Sharpe Gear Cutters
No. 3—26" Cincinnati Spur
No. 5A Lees-Bradner, 14" size
No. 61 Fellows Gear Shaper, belt

MANY OTHER MACHINES IN STOCK.

THE EASTERN

1001 TENNESSEE AVENUE,

MACHINE TOOLS

Gleason Bevel Gear Tester, belt
Schuchardt & Schutte Gear Tooth Rounder, belt, 10" cap.
Cross Gear Tooth Rounder, 24" cap.
20" Rochester Gear Tooth Rounder, belt

HEAVY DUTY DRILLS

20, 24" Barnes All Geared Self-Oiling
22, 26, 28" W. F. & John Barnes
32, 36" Cincinnati Bickford
No. 2, 22 Colburn Mfg.
D2 Colburn H.D.
No. 3D Minster
No. 314, 315 Baker
21,22, 24, 32, 36" Aurora
21, 25" Weigel

RADIAL DRILLS

2½' Avey Sensitive
3' American Sensitive
3' Carlton Sensitive
3' Mueller, gear box
4' Cincinnati Bickford Plain, gear box
4' Cincinnati Bickford Plain, d.c. drive
4', 5', 6' N.-B.-P. Semi-Universal, d.c. drive
4', 5', 6' N.-B.-P. Semi-Universal, gear box
4' Hammond Jack Knife
4', 5' Prentice, cone
4' Ryerson Plain, gear box
5', 6', 7' Dreses Plain, gear box
7' Fosdick Plain, cone

BORING MILLS

30" Colburn, 1 turret head
42" Gisholt, m.d., 2 swivel heads
48" Niles-Bement-Pond Car Wheel Borer
51" Baush Vertical, 2 swivel heads
7' Niles, 2 heads, cone
No. 2 Barrett Cylinder Borer, 5" bar
N.-B.-P. Cylinder Borer, 12" main bar

PLANERS

24" Cincinnati Crank, m.d., 1 head
24"x24"x12' Chandler, 2 heads, belt
36"x36"x10' Whitcb.-Blaisdell, 2 hds., belt
36"x36"x10' Cincinnati, 3 heads, belt
36"x36"x13' N.-B.-P., 1 rail, 1 side hd., belt
42"x42"x18' Cincinnati, 2 heads, m.d.

PRESSES

No. 268¼B Toledo Toggle Drawing 15" stroke, weight 175,000 lbs.
No. 496D Toledo Toggle Drawing, 11" stroke, weight 160,000 lbs.
McDonald Single Crank, 4" stroke
Waterbury-Farrel S.C., 1¾" stroke
Waterbury-Farrel S.C., 1½" stroke
No. 2S Consolidated, 3" stroke
C2 Ferracute O.B.I., 8" stroke
D2, DD2 Ferracute Drawing
P2 Ferracute Stiles Type
No. 6 Waterbury-Farrel, 1½" stroke
S51 Ferracute D.C.
DG53 Ferracute Redrawing, 10" stroke
No. 93A Toledo S.S., 17000 lbs., 3" stroke
B45 Metalwood Hydro-Pneumatic
30 ton Lourie Hydraulic

HAMMERS

No. 1 Pettengell Bumping, belt
60 lb. Bradley Rubber Cushioned Helve
80 lb. Bradley Rubber Cushioned Helve
100, 250 lb. Little Giant
200 lb. Bradley Upright Strap
350 lb. Niles-Bement-Pond Steam, new (3)
350 lb. Bement Steam
650 lb. American Eng. Wks. Steam
1500 lb. Morgan Single Frame Steam
2000 lb. Erie Double Frame Steam Forging
2000 lb. Niles Steam
2000 lb. Niles Steam

PUNCHES & SHEARS

Cleveland Model EF S.E., 36" throat
Buffalo Armor Plate Slitting, size 10 IWx20
No. 6 Long & Allstatter D.E.
No. 6 Long & Allstatter S.E.

MISCELLANEOUS

Norton Running Balance Indicating Machine, m.d.
No. 5 Williams & White Bulldozer
Sprague Dynamometer, 250 H.P. type TLF
No. 2 Cochran-Bly Filing Machine
No. 1 Fisher Oil Groover
Blevney Polishing Machine, type A
Production Polishing Machine
No. 11 Cochran-Bly Saw Sharpener
No. 1 Leighton Type Straightening Machine, new
¼" Shuster Wire Straightener, m.d.
⅞" Shuster Wire Straightener, belt
Cincinnati Mill Broach, m.d., new

AUTOMATICS

⅞" Model A Cleveland
1¼-1½" Cleveland Model B
1¼" Hartford
4 spindle ⅞" Cleveland
2½" Cleveland Model A
6" Cleveland Model A
No. 5A, 6A Potter & Johnston Automatics
No. 6D Potter & Johnston Auto. for b.d.w.
No. 23, 24 New Britain Automatics

GRINDERS

No. 6 Bryant Chucking, belt
No. 1 Fraser Lapper, 26" plate
No. 3 Brown & Sharpe Planer Type Surf.
Covell-Hanchett Knife No. 500 UK
18x48" Diamond L.D. Face, m.d.
30x84" Diamond H.D. Face, m.d.
54" Bridgeport Knife
12x48" No. 3 Modern Universal, belt
Cinc. Centerless Valve Seat Grdr., m.d.
No. 50 Heald Cylinder, hydraulic
No. 55, 60, 65 Heald Cylinder
6x32" Norton Plain Cylindrical, m.d.
No. 14—10x18" Brown & Sharpe Plain, belt
10x30" Queen City, m.d.
10x36" Landis Integral Cam, m.d.
10x36" Norton Plain, m.d.
10x50" Norton Plain, m.d.
10x52" Landis Plain, m.d.
12x18" Cincinnati Plunge Cut, m.d.

SEND US YOUR INQUIRIES.

MACHINERY CO.,

CINCINNATI, OHIO

MODERN TOOLS
FOR IMMEDIATE DELIVERY

LATHES

3—Porter—Cables
14"x6' Prentiss, G.H.
14"x10' American, M.D.
16"x6' Lodge & Shipley, G.H., Q.C., M.D.
16"x8' Pratt & Whitney, G.H.. Taper Attachment
16"x10' Hendey, M.D.
16"x10' Lodge & Shipley, Q.C., M.D.
16"x24"x10' Willard G.H. Taper Att.
18"x6' G.H. American, M.D.
18"x8' Lodge & Shipley, G.H.
18"x8' Superior Q.C., D.B.G., M.D.
19"x38"x10'x14' LeBlond, G.H., M.D., Sliding Bed
20"x8' American Q.C., D.B.G.
20"x8' Prentiss G.H.. M.D.
24"x12' G.H., M.D., American
24"x48"x18' J. J. McCabe, H.D.
96"x20' Putnam—geared Face P.D.

GRINDERS

2—No. 3 Van Normans, M.D.
No. 85 Van Norman M.D.
No. 96 Van Norman, M.D.
No. 10 Bryant Internal, M.D.
No. 11 Brown and Sharpe
No. 12 Pratt & Whitney, Vert. M.D.
6x18 Landis, M.D.
8x18 Storm, M.D.
16x54 Landis

BORING MILLS

4" Niles, M.D., Horizontal
36" Bullard, Vertical

DRILLS

2—2 spindle Allen H.S., B.B.
3' Morris M.D., Gear Box
5' Fosdick radial drill
6' American universal radial drill, M.D.

SHAPERS

16" Barker b.g., M.D.
16" Stockbridge, M.D.
24" Cincinnati, M.D.
24" Queen City, M.D. Swiveled knee
28" Flather, M.D., S.P.D.
36" Lodge and Davis

TURRET LATHES

No. 52 Natl. Acme, 4 sp.
No. 55 Natl. Acme, 4 sp.
3½ Greenlee
6¼ Gisholt
No. 3 univ. Acme, G.H., M.D.. Taper, 3¼" cap.
2¼" J & L with collets
3x36 J & L with collets
No. 5 Bardons and Oliver, 2", with collets, Friction Head, Hex. turret, P.F.T.
No. 4, 1-⅝" Acme

MILLERS

No. 0 Van Norman
No. 1 Kempsmith, Universal, M.D.
No. 1 Brown and Sharpe, Plain
No. 2 Owens Universal, M.D.
No. 2E Becker vertical
No. 3 LeBlond 3 step D.B.G., Plain
No. 5 Becker, Vertical
No. 7H Becker Production
No. 1½ Valley City—Univ. Compl.

MISCELLANEOUS

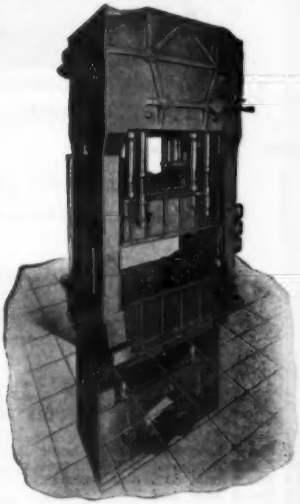
2 spindle Profiler, Power feed to table and rotary table

S. & S. MACHINERY CO.

207 Centre St., New York, New York

"IMMEDIATE DELIVERY!" MODERN LARGE PRESS

CLEARING CRANKLESS TRIPLE ACTION, 4-POINT SUSPENSION TYPE



Combined Cap. Blankholder & Plunger Slide, 1350 tons

- **Bed 84'x133'**
- **All Steel Construction**
- **Self-Contained**
- **Motor Drive**
- **All Gears Enclosed Running in Oil**
- **All Drives and Ram Adjustments Operated from One Control Board**
- **Wgt. Approximately 518,000 lbs.**

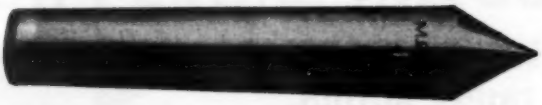
JUST RELEASED!

ANGLE IRON SHEARS: Covington 6x6x½", dble. end. Pels Angle & Beam Shear, 8x8x½
AUTOMATIC SCREW MACHINES: No. 1, 2, 3 Manville; No. 00 B&S; 1¼" Mod. G Cleve.
BORING MILLS: Horiz. 12" Niles Cyl. Boring Machine; 3" Lucas; 2½" Cleveland
VERT.: 36" Bullard Rapid Prod.; 50" Bullard
GRINDERS: Su:f. 14" P & W Vertical 15x15"x96" Norton, Springfield Planer Type No. 5 Abrasive, 48" Mag. Chuck, M.D.
HAMMERS—BOARD DROP: 1200 lb., 1000 lbs., & 800 lbs. Billings & Spencer, Bliss & W.W.; **HELVE:** 100 & 200 lb. Bradleys
LATHES: Floor, 36"x28' Bridgeford, with raising blocks, will swing 62"; 36"x16' Schumacher & Boye; 52"x22' Fifield; 30' Pit Lathe, 156" face plate
TURRET: 24" Gisholt; 26" Pond; 22" Libby Universal; 6¼" Steinle gd. hd.
MILLS: Planer Type; Ingersoll, 30x144", 2 heads; 4 heads, 14' bed, 6" spindle
PLANERS: 48"x48"x10' Cincinnati; 36x36 x12' Gray; 20' Niles Plate; 30x30x10' American; 26"x8' Cleveland Openside
PRESSES: Hyd. R. E. Ellis 4 Posts 16" Dia. 100 ton Litchfield Wheel; 150 ton Niles Wheel; 25 ton Horizontal
PRESSES, DOUBLE CRANK TOGGLE: No. 409 Bliss, 108" bet. housings; Tie Rod; Air Cushions; No. 268¼C Toledo, Twin Geared 97" between housings; Tie Rod
PRESS BRAKES: 30' Birdsboro, approx. ½" plate; self-contained; Ext. wgt. 200,000 lbs., OHL 10x5/16"; 8' 7/32"; 10' 10 Ga.
ROLLS: 20' Alliance Pinch Type 12' Wickes, Pyr. Type, drop end, M.D.; 12'½" H. & J. balance bar; 10' Wickes Vertical 8'x11" H. & J. plate straightening roll
SCRAP BALER: Galland & Henning Hydraulic; 60"x24"x18", with 30 H.P. motor, hopper, compressor, pump and tank
SHEAR: 16'1" Toledo 15" Gap. S.D.
SLITTER GANG. 72" Yoder M.D.
UPSETTER: 3½" Ajax

INTERSTATE Machinery Co., Inc.

1449 WEST PERSHING ROAD PHONE YARDS 5800 CHICAGO, ILLINOIS

VICTOR'S BARGAINS IN NEW
Carbon, High Speed & Tungsten Carbide Tipped Lathe Centers



THESE CENTERS ARE GROUND AND HARDENED

Taper	Whole Length	Net Prices Carbon	Net Prices High Speed	Net Prices Tungsten Carbide Tipped
1	3 5/16	$ .54 each	$1.55 each	$3.00 each
2	4 3/16	.65 each	2.25 each	5.00 each
3	5 1/4	1.10 each	3.25 each	8.00 each
4	6 3/4	1.60 each	4.25 each	12.00 each
5	8 1/2	3.15 each	6.25 each	18.00 each

NEW DRILL SLEEVES
WITH MORSE TAPER SHANK

	Net Prices
1-2 No. 1 hole and No. 2 Shank	$ .45 each
1-3 No. 1 hole and No. 3 Shank	.60 each
2-3 No. 2 hole and No. 3 Shank	.60 each
2-4 No. 2 hole and No. 4 Shank	.75 each
3-4 No. 3 hole and No. 4 Shank	.75 each
2-5 No. 2 hole and No. 5 Shank	2.00 each
3-5 No. 3 hole and No. 5 Shank	2.00 each
4-5 No. 4 hole and No. 5 Shank	2.00 each
4-6 No. 4 hole and No. 6 Shank	7.00 each
5-6 No. 5 hole and No. 6 Shank	7.00 each

NEW
SLEEVES WITH BROWN & SHARPE TAPER

Inside	Outside	Our Price Net Each
4	7	$2.00
5	7	2.00
7	9	3.75
7	10	4.00
7	11	5.00
8	10	4.50
8	11	5.50
9	12	7.25
10	11	7.50
10	12	7.50

Morse Inside	B & S Outside	Our Price Net Each
2	9	$2.75
3	10	3.75
3	11	4.50

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251 CENTRE STREET **NEW YORK CITY**

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EMERY WHEEL DRESSERS

A very efficient tool for dressing Emery Wheels.
Diamonds are mounted in 7/16" diameter rods 6" long.

¼ KT. FOR USE ON 6" DIA. WHEELS OR SMALLER
$3.00 each net

½ KT. FOR USE ON 8" DIA. WHEELS OR SMALLER
$4.50 each net

¾ KT. FOR USE ON 10" DIA. WHEELS OR SMALLER
$7.50 each net

1 KT. FOR USE ON 12" DIA. WHEELS OR SMALLER
$10.00 each net

1½ KT. FOR USE ON 24" DIA. WHEELS OR SMALLER
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MOUNTED FREE IN ANY DESIRED HOLDER

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VICTOR'S BARGAINS IN
Tungsten Carbide Tipped Tools

Price $1.00 Each In Any Size

New Low Prices. — Increase Production — Cut Operating Costs

Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.

Left—100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	¼x¼x2
R-101	L-102	5/16x5/16x2¼
R-103	L-104	⅜x⅜x2½
R-105	L-106	7/16x7/16x3
R-107	L-108	½x½x3½

Right—200 Series

Tool No.	Shank Size
200	¼x¼x2
201	5/16x5/16x2¼
202	⅜x⅜x2½
203	7/16x7/16x3
204	½x½x3½

Below—300 Series

Tool No.	Shank Size
300	¼x¼x2
301	5/16x5/16x2½
302	⅜x⅜x2½
303	½x½x3½

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.

Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits

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HIGH GRADE TOOLS

LATHES

14"x6' American Bowl Hd. 4 S.C.D. B.G. Q.C.
16"x8' Hendey Lathe, 4 S.C.D. B.G. T.A. Q.C.
18"x8' Mueller Lathe, 3 S.C.D. D.B. G. Q.C.
18"x8' Sidney Lathe, 3 S.C.D. B.B.G. Q.C.
18"x8' American Lathe, 3 S.C.D. D. B.G. Q.C.
18"x8' American Lathe, 3 S.C.D. D. B.G. Motor driven
18"x8' Greaves Klusman Grd. Hd. Lathe Q.C. T.A.
18"x8' Greaves Klusman Grd. Hd. Lathe, Q.C. M.D.
18"x8' Boye & Emmes 3 S.C.D. D. B. G. Q.C.
18"x8' LeBlond 3 S.C.D. D.B.G. Q. C. motorized
19"x12' Sidney H.D. 3 S.C.D. D.B.G. T.A. Q.C.
20"x16' Greaves Klusman Grd. Hd. Q.C. T.A.
21"x8' LeBlond H.D. 3 S.C.D. D.B. G. Q.C.
24"x10' Lodge & Shipley 3 S.C.D. D. B.G. Q.C.
25"x16' LeBlond H.D. 3 S.C.D. D.B. G. Q.C.
36"x20' Putnam 5 S.C.D. B.G.
42"x16' Boye & Emmes H.D. 5 S.C.D. Trip. Grd. Q.C.

PLANERS

36"x36"x10' Detrick & Harvey Open-side Belt Drive

RADIAL DRILLS

3' Morris Plain Radial Drill S.P.D.
2—4' Bickfd. Pl. Radial Drills, S.P.D.
6' Bickford Pl. Radial Drill. S.P.D.

GEAR MACHINERY

No. 3-26" B & S Automa. Gear Cut.
No. 1 Adams Farwell Gear Hobber
No. 3 Adams Farwell Gear Hobber

SHAPERS

24" Rockford H.D. Cone Drive
24" Steptoe H.D. Cone Drive

HORIZONTAL MILLS

3" Lambert Horizontal S.P.D.

GRINDERS

12"x36" Landis Self Contained Plain
14"x72" Queen City Self Cont. Plain
16"x52" Landis Crankshaft Grinding Machine, M.D.
No. 55 Heald Internal Grinders
Cataract Precision Grinder
No. 51 Oliver Drill Grinder M.D.
No. 5 Oliver Drill Grinder M.D.
No. 29-53" Besley Disc Grinder
12" Pratt & Whitney Surf. Grinder

TURRET LATHES

No. 2 Warner & Swasey Tur. Lathe
1½" Millholland Turret Lathe

MISCELLANEOUS

No. 35 Niagara Presses, Belt Drive
Quickwork Rotary Shear
No. 1 Klemm Metal Band Saw
Atkins Metal Cutting Back Saw
35 K.W. Federal Spot Welder
No. 1 Baker Keyseating Machine
2" Acme Bolt Cutter
2" Landis Bolt Cut. with Lead Scrw.
No. 1 LaPointe Broaching Machine
2" Landis Pipe Threading Machine
C12 Natco Multiple Drill
20 spindle No. 2 M.T. Natco Drill
1" Roller Pipe Cutting Machine
Savage 3/16" Nibbler
Savage ⅜" Nibbler

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GOOD DELIVERY

AUTOMATICS

1" Model R Acme Gridley 6-spdl. Anti-friction bearings, magazine feed, motor drive
1" Cleveland Model J double end thread., pointing, turning or drill.
1¼" No. 55 Natl. Acme 4-spdl.
2" Cleveland Model A
2¼" No. 56 Natl. Acme 4-spdl.
No. 24 New Britain chucking
No. 33 New Britain chucking
No. 34 New Britain chucking
No. 6A Potter & Johnston.
18" Gisholt Simplimatics

AIR COMPRESSORS

136', 8"x8" Chicago Pneumatic Tool Co., type N8B
136', 8"x8" Ingersoll Rand, type ERI
350', 12"x10" Ingersoll Rand
357', 12"x10" Bury, class HL
550', Natl. 3-cylinder vertical
620', 14" x 8½" x 10" Sullivan, class WJ3, angle compound, 2 stage, synchronous motor
706', 17" x 9½" x 12" Sullivan, class WJ3 angle comp., 2 stage
868', 17" x 10" x 12" Chicago Pneumatic Tool Co., type OC B, 2 stage

BULLDOZERS

No. 23 Williams & White, 7"x 39" crosshead
No. 5 Williams & White, 12½"x 63" crosshead
No. 29 Williams & White, 16"x 90" crosshead

GEAR MACHINERY

No. 18H Gould & Eberhardt universal gear hobber
12"x13" No. 12H8 Gould & Eberhardt Mfg. hobber
12"x10" No. 12 Barber Colman hobbers
24" No. 3 Adams Farwell gear hobbers
8"x10" No. 1 Lees Bradner production hobber
14"x8" No. 5A Lees Bradner universal hobbers
20"x8" No. 3 Brown & Sharpe auto. spur
36"x6" Gould & Eberhardt spur gear cutter
48"x10" No. 4 Brown & Sharpe automatic spur
15" Gleason bevel gear quencher
Gleason bevel gear tester
Gleason circular finish. cutters, without blades
Natl. Tool Co. (Cleve.) Model B gear and gear shaper cutter checking machine
Lipe gear tooth chemfering machine, double spindle
No. 2 Schuchardt & Schutte automobile hob grinder
No. 3 Barber Colman hob grinder

GRINDERS, CYLINDRICAL PLAIN AND UNIVERSAL

6"x32" Norton
10"x20" Bath No. 1 universal
10"x24" Landis
10"x36" Bath No. 2½ universal
10"x36" Norton
10"x50" Norton
10"x52" Landis
12"x36" Landis self contained
12"x72" Landis
16"x42" Landis No. 3 universal

GRINDERS, MISCELLANEOUS

17"x36"-48" Norton hydraulic crk. pin, type B, Mod. 84
No. 2 Heim centerless
Pratt & Whitney Worm
14" Pratt & Whitney BB surface
Hutto MD honer
Norton lappers, type 15
No. 75 Heald internal
No. 6 Bryant internal
24" No. 84 Gardner disc
53" No. 24 Gardner disc
No. 2 Schuchardt & Schutte hob.
No. 3 Barber Colman hob

ENGINE LATHES

14"x6' Monarch
14"x6' LeBlond
14"x8' Lodge & Shipley
14"x8' Monarch
16"x6' Cincinnati
16"x6' Monarch
18"x8' American
16"x10' Monarch
18"x6' Rahn Larmon
18"x8' Walcott
18"x8' Monarch
19"x8' Sidney
20"x10' American
20" (22") x10' Davis, dbl. b-gd.
24"x10' Schumacher & Boye, dbl. back gears, taper att.
24"x10' LeBlond heavy duty, dbl. back gears, taper att.
24"x10' Hendey stand. chge gr.
24"x10½' New Haven
24"x12' Lodge & Shipley
24"x14' Schumacher & Boye
24"x16' Schumacher & Boye dbl. back gears, taper att.
36"-43"x18' New Haven Q.C.G.
36"-47½"x21'6" Wickes Q.C.G.

LATHES, TURRET

14" Warner Swasey
Nos. 4, 6 & 9 Foster
No. 4 Acme 18" swing
2½"x26" Acme
No. 4 Bardons
2¼"x24" & 3"x36" Jones & L.
24" Bullard vertical side head
No. 3 Gisholt, 18" swing
21" Gisholt
24" Steinle

LATHES, PRODUCTION

9" Rockford Mfg.
No. 9 LeBlond Multi-cut
13"x4' LeBlond geared head
13"x6' Automatic thread, lathes, geared head
16"x10' LeBlond rapid product.
16"x5' Monarch Mfg. or rapid production
17"x8' LeBlond geared hd. Mfg.
18"x7'6" Wickes geared head, rapid production
18" Gisholt Simplimatics
Melling 4-cylinder Camshaft lathe
Melling 6 cyl. Crankshaft lathe
34"x61½"between spindles Wickes semi-auto. center dr. crkshaft.
9"x14" Porter Cable
11" LeBlond rapid production

BORING MILLS

24" Bullard with side head
30" Bullard single turret
36" Niles car wheel
42" Niles
60" Bullard
60" Colburn

MILLERS

No. 2 Owen universal
No. 34 Ohio plain
No. 14A Garvin plain
No. 3 Van Norman duplex
No. 3½ Fox hand
Nos. 3 & AB Becker vert.
No. 3 Brown & Sharpe vert.
No. 6 Becker vertical
Nos. 1 & 1½ Knight vert.
Mod. C Becker rotary
48" Newton rotary
60" Ingersoll rotary
Nos. 1 & 1A Davis & Thompson
No. 45 Bilton Productomatic
48" Ohio tilted offset
12" Cincinnati plain Mfg.
No. 2M Potter & Johnston auto.
No. 33 Kempsmith Mfg.

PLANERS

24"x24"x5' Gray
24"x24"x24" Cincinnati crank
24"x24"x6' Gray
24"x24"x6' Woodward & Powell
26"x26"x8' American
30"x30"x10' Cincinnati
32"x32"x12' Niles
36"x36"x12' Cincinnati Heavy
36"x36"x16' Cleve. openside
56"x56"x16' Gray

PRESSES

4' Cincinnati press brake
10'x10 ga. Chicago press brake
No. 7 Toledo
No. 21½ Bliss O.B.I.
No. 4 Wat. Farrel O.B.I.
No. 62 Bliss Openback
No. 76 Toledo openback
No. 6 Wat. Farrel openback
28" Swaine dbl. cr., 35 ton
44" Leffler dbl. cr., 88 ton
No. 65 Bliss Consolidated S.S.
No. 4 Hamilton S.S.
No. 53 Toledo S.S.
No. 7 Rockford S.S.
No. 8-7 Zeh & Hahnemann S.S.
Nos. 55½ & 57S Toledo S.S.
No. 30 E Cleve., 1300 tons S.S.
No. 180 Toledo toggle
No. 796½D Toledo toggle
750 ton Baldwin Southwark triple action hydraulic
No. CA 14 Ferracute
No. 41A Toledo horn
No. P2 Ferracute
No. 2 Standard screw
150 ton No. 661 Toledo coin
450 ton Ferracute coining

PUNCHES

6" throat 1" x 6" Hendley & Whittemore No. 54, punch, rod cutter and shear, with angle shear attach.
12" throat 1¼"x1 Long & Allstatter No. 1½, architect. jaw
12" throat 1¼" x 1" Cleveland horizontal, arch. jaw
26" throat, ¾" x ¾" Cleveland, architectural jaw

SHAPERS

7" Rhodes
15" American
16" Walcott
20" Smith & Mills
22" Ohio
24" Gould & Eberhardt

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MILES MACHINERY CO., SAGINAW, MICH.

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SOLD WITH AN ABSOLUTE GUARANTEE OF SATISFACTION

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Cleveland, Models A, C, 1¼", 2"
Model J Cleveland dble. end
Nos. 24 & 34 New Brit. Auto. Chucking, m.d.
1¼" 4-spindle Radical (4)

No. 8 Williams & White Bulldozer

DRILLS
No. 310 Baker Drills (8)

Drills
2, 3, 4 spdl. H.&W., Allen Lel-Giff., Avey (33)
3' & 5' Western Radial
3½' Morris Radial, m.d. & m.
Pratt & Whitney dble. end,, m.d. & m.
Fox Mult. Spdle. with tapp. att. (4)
No. 121 2-spdle. Baker Gang Type, mult. sp. heads, rot. tables, m.d. & m. (3)
21" Cincinnati Bickford Sliding Head, with table

Gear Equipment
No. 36 ST G. & E. Auto., 4 spdl. Gr. Rgh.,m.d.
No. D-2 Colburn Heavy Duty
No. 5A Lees Bradner Gear Hobbers, (3)
W & W Gear Cutter, cap. incl. gears up to 96" dia. x 52" face

Grinders
No. 14 Brown & Sharpe Plain Cyl.
Nos. 15A & 20 Bryant Chucking, Int. and Face
20"Badger Face, hyd. feeds, table travel 44"
Nos. 55 & 60 Heald Internal
Norton Model B Tur. type, motor drive (2)
No. 1 Osterholm, face
No. 126 Gardner dbl. spdl. op. m.d. type, h.f.
12" and 16"x36" Cincinnati Pl. Cylinder, (2)

HEAVY DUTY LATHES
24"x16' Prentice, Geared Head, taper attachment, single pulley drive
36"x16' Hamilton, geared motor drive & motor, double back geared
28"x10' Chard, quick change, taper attachment, double back geared
36"x20" Lodge Davis, t. a., back geared
28"x14' Walcott Bk. Grd., quick change gear, taper attachment

Lathes
20"x8' Gisholt Turret, (4)
18" Cinc. Acme Turret, back geared (3)
16"x5' Cisco Lathe, quick change gear, countershaft
16"x8' Hamilton, m.d. & m., t.a.
16"x8' Bradford Geared Head
2¼" & 3"x36" Jones & Lamson Turret
Nos. 5A & 6A Potter & Johnson Auto., m.d.
34"x11' Wickes Semi-Auto. Crankshaft (2)
Lo-Swing, 60" bet. cent. 12" swing
16"x6' Hendey, quick change gear, motor dr.
16"x12' Lodge & Shipley, q.c.g, t.a.

Cincinnati Press Brake, 6' ¼" capacity, motor driven with motor.

Mills
Nos. 1, 2 & 3 Craftsman Prod., Rotary
Niles Vertical Boring, 28" table
No. 3 Brown & Sharpe
4-spindle Newton Rotary Drum Type Miller
No. 2 Cincinnati Plain
No. 3 Cincinnati Plain (2)
No. 7 Becker
No. 3 Becker Vertical
54" Ingersoll Rotary, 3 head, m.d.
66" Newton Rotary, motor drive

Planers
36"x60"x14' American, wid. to 60", rl. insd. hd.
42"x42"x12' Bedford Openside, m.d. & m.
36"x36"x8' Pond Planer, one rail, one side hd.
30"x30"x6' Pond Planer, 2 rail heads

Presses
No. 24B Bliss Gap Frame D.C., B.G., m.d. & m.
251½ Cleveland Dble. Cr., gap frame, m.d.&m.
No. 55½ Toledo Tie Rod, with dble. roll fds.
No. 62 Toledo (2)
No. 63 Michigan, S.S.
Nos. P2-P4 Ferracute, motor drive
Canco, No. 5, 8" stroke, S.S., B.G., m.d. & m.
DG-53 Ferr. S.S., S.C., B.G., G.M.D.
No. 6C Rockford dble. cr., straight side

LARGE DOUBLE CRANK PRESSES
No. 407 Bliss Double Crank Toggle Press, motor drive & motor
No. 410 Bliss Double Crank Toggle Press, motor drive & motor
No. 10C Bliss Dble. Crank, Tie Rod Frame

Shears
Niagara, Nos. 10, and 236
Cincinnati Power Squaring Shear, 10' 3/16" capacity, m.d. & m.

Upsetters
1½" Acme, steel bed, m.d.

X-Ray machine, 250,000 volt General Electric, lead lined, will X-Ray boiler plate up to 2" thick, overall dimensions, length 102", width 84", height 88"

Welders
Federal, 150 KW, motor drive
35 KVA Multi Hydromatic, mtr. dr. & m.

AND A COMPLETE STOCK OF FINE UP-TO-DATE EQUIPMENT

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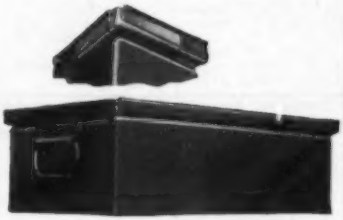

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Weight 15 lbs. Well constructed.

24"x15"x7½"—18 gauge, drop handles both ends. Lots of 25 or more.

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Automatic, Fay 14"x24"
Boring Mill, Niles 60" Vert., 2 hds.
Boring Mill, Bullard 28" with side hd.
Boring Bar, Bement 4" spindle
Gear Shaper, Fellows No. 7 High-Speed
Gr. Generat., Gleason Spiral Bevel, 4" md.
Gear Cutter, Cincinnati No. 3
Radial Drill, American 3'-9" rd. column, tapp. attach.
Radial Drill, Western 3' & 5', s.p.d.
Radial Drill, Prentice 4' Standard, gr. box, s.p.
Lathe, Hendy 14"x6' grd. hd. 8-speeds, qk. chg.
Lathe, Hendy 16"x8' qk. ch. taper attach.
Miller, Brown & Sharpe No. 3 Univ. compl.
Roll, Niagara 6' Slip—4-¼" dia. rolls
Shaper, Gould & Eberhardt, 24"
Shaper, Potter & Johnston, univ. table 24"
Lathe, LeBlond 21"x8', Heavy-Duty Qk.Ch.
Lathe, American 20"x10', Qk. Ch., gd. hd.
Grinder, Heim, centerless

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GOOD LATHES — GOOD VALUES

40" 20' Houston Stanwood & Gamble Triple Gear, Q.C.G. Taper & Equip.
40"x14' Gleason, D.B.G., Q.C.G., Equip.
28"x20' Schumacher-Boye, D.B.G., Q.C.G., Taper and Equipment
28" 22' Davis, D.B.G., Taper and Equipment
2¼" Acme Turret Lathe
No. 3 Becker Vertical Miller—Equipt.
No. 2 Landis Grinder—Universal Head

Also Turret Lathes, Millers, Shapers, Planers, Radials, for Immediate Delivery

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212 CENTRE ST. NEW YORK, N. Y.

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12"x6' Hendey Geared Hd.
16"x8' Lodge & Shipley
16"x8' LeBlond
17"x8' LeBlond
20"x10' Monarch
21"x10' LeBlond

TURRET LATHES
⅝" P. & W. Wire Feed
No. 1 Pratt & Whitney Pl.

MILLING MACHINES
12" Cincinnati Production
No. 1 Standard

DRILLS
4-12" Buffalo High Speed
16" Sipp
21" Buffalo B. G.
25" Snyder P. F.

HAMMER
No. 2B Nazel

MISCELLANEOUS
No. 1 Catlain Keyseater
No. 1 LaPointe Broach
2-7" Cataract Lathes
4" Oster Pipe Machine
6" Oster Pipe Machine
9"x5" Peerless Saw
6"x6" Marvel Saw

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FIRST - GRADE USED MACHINERY

WIRE for inspection point—*that's the way to tell*

Some still set up—just as they stopped running

LATHES—Triple Geared

48" swing, 26' bed, "Johnson"
48" swing, 22' bed, "Johnson"
36" swing, 26' bed, "Putnam"

LATHES—Back Geared

36" swing, 14' bed, "N.-B.-P."
32" swing, 24' bed, "LeBlond"
24" swing, 12' bed, "LeBlond"
OTHER SIZES DOWN TO 14" SWING

RAILWAY SHOP TOOLS

90" swing **DRIVING WHEEL LATHE;** dbl. head; motor-dr. "Niles-Bement Pond"
80" swing **DRIVING WHEEL LATHE;** dbl. head; belt-dr., "Bement-Miles"
42" swing **CAR WHEEL LATHE;** double head; motor-dr., "Niles-Bement-Pond"
42" swing **LATHE,** for banding or armature work; motor-dr., "Peerless"
30" swing, 16' bed, **JOURNAL & AXLE LATHE;** 2 carriages; motor-dr., "N-B-P"

PLATE SHOP MACHINERY

FLANG. PRESS, 450-tns.; "R. D. Wood Co."
ANGLE BENDING ROLL, 4"x4"x⅝" cap'y., No. 2; motor-dr., "Williams & White"
60" throat, **PUNCH & SHEAR,** (Interchangeable); sgl. end; cap'y., 1¼"x1" "Cleve."
54" throat, **PUNCH & SHEAR;** double end; cap'y. 1"x¾"; "Hilles & Jones"
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Cleveland, Model A, 1¼ & 2"
Gridley, 2¼, 3¼ & 4¼" Single Spdle.
New Britain, No. 22
Automatic Threading Lathes, 13"x6' G.H.

BORING MILLS, 54" Niles, 2 Swivel Heads
42" Bullard, 2 Swivel Heads

DRILLS, Edlund, No. 1A, 4 spdl. P.f. No. 3 M.t. M.D.
Cincinnati 21" Direct Drive, M.D.
Baush & Natco Multiple spindles
Morris, 4' Radial M.D.
Henry & Wright, 1 to 8 Spdl., No. 2 mt.

GEAR CUTTERS, Fellows No. 61 Shaper

GEAR HOBBERS, Barber-Colman No. 12

GRINDERS, B. & S No. 2 & 3 Universal
B & S No. 12 & 16 Plain
Heald No. 65 Cylinder
Landis, 16x66" Plain
Norton, 16x36" Crankshaft
Norton, 18"x96" Plain with 30" Gap
Norton, 10x24 & 36" Plain

LAPPERS, No. 15 Norton, M.D.

LATHES, Hendey, 14"x5' & 18x10'
National, 18x8' Cone, Q.C.
Schumacher & Boye, 24"x10' Cone, Q.C.
Jones & Lamson, 3x36" M.D.

MILLS, Becker, Vertical, 30" Rotary Table
Becker Vertical No. 4B & Model B
Briggs Type A & B Mfg.

PRESSES, No. 94 Bliss, Solid Back
No. 68N Bliss Double Action Cam
No. P 3 & 4, & P G 2 Fer., Solid Back
No. 34 Toledo Solid Back, Geared

•PLANERS, 24"x24"x5' Gray, M.D.
30"x30"x8' Cincinnati, M.D.

PROFILERS, P. & W. No. 13 Single Spindle

TAPPERS, No. 1, 2 & 2X Garvin
6 Spdl. Holmes Tilted No. 3

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24" Cinc. Uprt. Pwr. Fd. Back Grd.
21" Excelsior Uprt. Pwr. Fd. Back Grd. New
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Rec. Head, 13½"x31" area
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18"x10' Sidney Q.C.G. Tap. Att.
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24"x16' So. Bend Std. C. G. Tap. Att.
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No. 23 Baxter D. Whit. Int.
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No. 3 Becker Vertical
No. 2 P & W Hand
No. 6 Whit., Hand, BD&MD.
No. 2 LeBlond Univ. B.G. Cone Hd.
No. 3 Cinc. Plain, M.D.
No. 3A B&S Grd. Hd. Univ. Sgl. Ply. M.D.
No. 3S Cinc. Hi-Pwr. Plain, Sgl. Ply. M.D.
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14"x6' LeBlond Geared Head Engine Lathe
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20"x8' American Engine Lathe
24" Steinle Turret Lathe—4" Hole Spindle
18"x16' Hendey Engine Lathe

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16"x8' American
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No. 30 Natco 24-Spindle Multiple Drill
No. 10A Bausch 18-Spindle Multiple Drill
No. 10 Bausch 24-Spindle Multiple Drill
No. 3 Bausch 24-Spindle Multiple Drill
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DRILL, 10 spindle Natco, No. 1 M.T. head 13" diameter
DRILL, 3' Prentice Radial, mtr. dr.
GRINDER, 20"x144" Landis Plain, mtr. dr.
GRINDER, 16" Heald No. 25, rotary surface
GRINDER, 12"x36" Pratt & Whitney, belt dr.
GRINDER, 12"x36" Modern Plain Cylindrical, self ctd. drive
KEYSEATER, No. 2 Baker, belt, cap. 2"x20"
LATHE, 42"-60"x24' New Haven, belt dr.
LATHE, 30"x20' LeBlond, motorized, q.c.
LATHE, 18"x16' Flather, belt drive, q.c.
PIPE MACHINE, ½" to 2" Landis, b.d.
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Lathe, 42"x22' American solid spindle, BD.

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2 24" Gisholt Turret Lathes
1 28"x10' New Haven Engine Lathe
2 17"x6' Le Blond Engine Lathes
1 17"x8' LeBlond Production Lathe
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2 25"x14' Le Blond Heavy Duty GH Prod. Lathes
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1 14"x19" Fay Automatic Lathe
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1 53" Niles Vertical Boring Mill
1 3-¾" Barrett Horizontal Boring Mill
1 Coulter Vertical 2 spindle Diamond Bor.
1 4" Niles Horizontal Boring Mill
1 24"x24"x6' Ingersoll Slab Mill
1 36"x30"x22' Ingersoll Mill
1 No. 4 Loss Bradner Thread Mill
1 No. 1½ Cincinnati Plain Mill
1 No. 2 Cincinnati Plain Mill
1 No. 3 Becker Plain Mill
1 2½' Dreses Radial Drill
1 2½' American Radial Drill
1 5' Niles Radial Drill
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1 No. 14 Brown and Sharpe Grinder
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Lathes: American 27x16, Geared Head American 20x12 Cone Head Lodge & Shipley 14x6 Geared Head, MD. Monarch 12" and 16" Gd. Hd., M.D. Monarch 14x6 Cone Head, M.D. Boyo & Emmes 24x16 Cone Head, T.A.

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Blower, B.F. Sturt. 1/6 hp 110v sgl. ph. $25.
Buffing Jack, No. 4 Zucker & Levett & Loeb .....$35.
Heater, Steam Coil, Skinner Bros. No. 1-ON-U-1567 Type 223 UA, width-std. length-std. less motors .....$150.
Furnace, Soda & Potash, gas burner $100.
Furnace, Surf. Comb., Soft Metal with fan and hood No. 27125 .....$150.
Hammer, 100 lb. drop with c/s .....$90.
Tool Grinder, No. 2 Baird with c/s ...$25.

THE BAIRD MACHINE COMPANY
BRIDGEPORT CONNECTICUT

AUTOMATIC SCREW MACHINES

Cone 4 Spdl. 1¼" Cap.
Gridley Sql. Spindle 4¼" Ser. 4000
Gridley 4 Spdl., ¾" Cap.
Brown & Sharpe Full Auto. No. 19, No. 2, No. 00G
B. & S. Cut Off No. 0, H.S. Oversize

Spdl. Wide Cross Slides, Rebuilt
Cleveland Mod. A, 3¾" Ser. 27000
Cleveland Mod. A, 3½" M.D.
Cleveland Mod. B, 1¼" Ser. 21970
18" Feed
Cleveland Mod. B, ⅝"-⅞" Ser. 32068

HAND SCREW MACHINES
No. 4 Bardon & Oliver, Bar, Pwr. to Turret
No. 3 Bardon & Oliver, Bar, Pwr. to Turret
No. 3 Foster, Bar Fd., Pwr. to Turret
No. 2 Woods, Bar Fd., Collets & Tooling
24" and 14" Gisholt Univ.

NEW MICROMETERS
1" to 12" Outside
2" to 12" Inside
1" — 2" — 3" Depth

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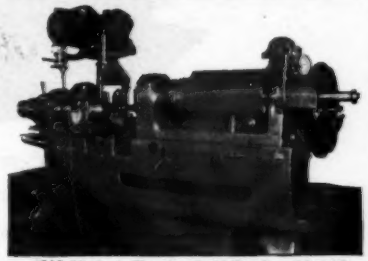

5½" Mod. A Cleveland, M.D., Ser. 32,000

DRILLS
Barnes Camelback, 20" All Grd. Self Oil, Tapper
Baker 121, No. 4 M.T., All Geared, S.P.D.
Foote-Burt No. 4 M.T., geared
L & G 3 spdl., pwr. feed, No. 2 M.T.

LATHES
14"x8' Hendey, M.D., Taper Attachment
19"x10' Flather, Q.C., 2 Chucks

SHAPERS
24" Stockbridge, B.G., vise, M.D.
20" Steptoe B.G., Vise, Countershaft
16" Gould & Eberhardt, Vise, Countershaft

GRINDERS
12"x36" Modern, Self Contained
5"x12" Greenfield Hydraulic
W. & M. Auto. Surf., 8"x24" Table
Heald No. 65 Cylinder, Internal
Heald No. 70 Internal
Heald Rotary 8" (Bench Type)
Rivett No. 6 Internal

MILLERS
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No. 2 Kempsmith Plain, M.D.
No. 2 Cincinnati Universal, M.D.
No. 1½ Brown & Sharpe Plain, Vert. Att.

MISCELLANEOUS
Brown & Sharpe 3"x36" Auto. Gear Cutter
Pratt & Whitney Dble. Table Spline Miller
Bradley Compact Hammer, 125 lb.
Waterbury F. Arch Press, Geared 8" strk.

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NEW 3 Phase B. B. Motors ½ to 25 H. P., 5 H. P. $55.75

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20" Lever, Wheel & Lever and Power Feed.
24" and 28" sliding head, back gear, power feed.
4 spindle Foote-Burt, heavy duty.
32" Hoefer sliding head, new.
17" and 14" Delta, new.
1, 2 and 4 spindle high speed 8" overhang.
5' Bausch Radial Drill.
59 other drills of various sizes and types.

MISCELLANEOUS
Brake, Robinson, toggle, 5'.
Grinders, cutter and cylindrical, plain and univ.
Grinders, Bryant deep hole chucking.
Broaching Machines, No. 1 and No. 3 LaPointe.
Keyseater, No. 1 Davis.
Lathe, 24"x16' Greaves & Klusman.
Lathe, 28"x20'. 6" Rahn Carpenter, with rais. blocks.
Milling Machine, Briggs Type A.
Milling Machine, Brown & Sharpe No. 12.
Milling Machine, 20"x20"x8' Ingersoll Slab, m. d.
Punch & Shears, several, different sizes.
Shaper, 24" G & E, back geared crank.
Spencer turbine compressor, 150 CFM, 16 oz. pressure.
MOTORS, REBUILT 3 Phase ½ to 50 HP various speeds.

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MOTOR DRIVEN GRINDERS

SIZES

6"x32"	10"x72"	14"x96"
10"x18"	14"x36"	16"x50"
10"x24"	14"x50"	16"x72"
10"x36"	14"x72"	18"x96"
10"x50"		

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645 WASHINGTON BLVD. CHICAGO

"MACHINES HARD TO FIND"

2" Landis Double Head Bolt Cutter
3" Landis Single Bolt Cutter with lead screw
1—30"x36"x20' Whitcomb Planer, 2 hds. on cross rail, m.d.
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Rockford Single End Hydraulic Boring Unit with 2-sta. 54" dia. table
1—No. 3 Barrett 6" bar Cylinder Boring Machine, m.d.
1—No. 60 NATCO 3-way Mult. Spdl. Drilling Machine, m.d.
C-13H NATCO Hydraulic, m.d.
No. 14 NATCO Multiple, with 12 spindles
No. 30 NATCO 24x40" head
No. 40 NATCO Straight Line Multiple Drill
1—6' Niles Plain Radial Drill

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Good Used Machinery

ARC WELDER—Wilson 300 Amp. m.d.

BORING MILLS—Baush 44" m.d. Bullard 51" Vert., 2 hds., Bullard 42" Mill, vert.; Rockf. No. 2 horiz., 3⅛" Bar; Colburn 42" Vert. 2 Hds.; Colburn 42" one head; Mach. Tool 3" Horiz.

BRAKES—Keene 10' 16 ga. Toggle Press

COLD SAWS—Newton 9" cap., Cochrane & Bly Nos. 2-B & 4-B; Higley No. 14

CUT-OFF MACHINE—Davis 6" cap.

DRILLS (RADIAL)—Fosdick 4', Carlton 4' all gear box dr.; Hammond 4' sensitive; Bickford 6' gr. box; Mueller 4½' g. box; Morris 3' Gr. Box; American 5'

DRILLS (H. S. B. D.)—H & W 2, 4, 5sp.; Sipp 1 & 2 sp.; Allen 2 & 6-sp.; **Avey,** Demco, Lel-Gif. 1-sp.; Avey 2-sp.

DRILLS (MISC.)—Defiance Hvy Duty 2" cap.; Hamilton 42" S. H.; Barnes 20" & 24" 1-sp. & 20" 4-sp.; P W No. 12 Multi-Sp.; Natco 20 sp. Rect. head; P. & W. 24 sp. rectangular head Adj.; Barnes 4-Sp. 24" Camelback; Moline 4-Sp. Hole Hog; Colburn 20" S.P.D.

GEAR CUTTERS—B & S 26" s. p. d. automatic spur; Cincinnati 36" gear cutter. B. & S. 48"x10"; G. & E. 48" gear Cutter; Fellows 36" Gear Shaper

GRINDERS—P & W 12" vert. surf.; Cin. No. 2 & B. & S. No. 12 univ. tool, B & S No. 16 pl.; B & S No. 2 Surf.; Heald Nos. 60 & 65 Int.; Landis 10x30" Plain; B & S 10x48"; Badger No. 220, auto. d. e., opposed disc (4); Diamond No. 2 Auto. Surf.; Landis No. 3 Univ.; Cinc. 12x36" pl.; Ohio No. 3 Univ.; Bath Univ. W & M No. 2 Surf.

HAMMERS—Mayer 50-lb.; W & W 165 lb.; Kane & Roach 70 lb.; Beaudry 150 lb.; Beaudry 200 lb. Upright Helve

KEYSEATERS—Mitts & Merrill No. 5 vert. Davis No. 1; M. & M. No.0; M. & M. No. 2.

LATHES—Monarch 16"x10' M.D.; Lehmann 18"x9'; American 34"x18' Q.C.G. M.D. Hvy.; Amer. 22x8'; Davis 22"x10'; L & S 20"x10'; S-B & E 20"x10' q. c. g; Flather 22"x10'; LeBlond 16"x8'; Gleason 45"x12"; Monarch 16"x8' (2); Ryerson 20x10', m.d.; S.B.E. 30"x12' Q.C.G. Hendey 16"x8' C.H.; Hendey 16"x10' grd. hd.; Sidney 18"x8' and Flather 16"x8'. L. & S. 16"x8' M.D.; S. Bend 16"x8'

MILLING MACHINES—Ohio No. 29, Ohio No. 20, Hendey No. 3, B & SNo. 3, LeBlond No. 3H, Cin. No. 1 s.p.d. Plain; Cleveland; No. 2, s.p.d. Plain; Owen Duplex; Ingersoll M.D. Slab Miller 4 hds.; Newton Vert. with rotary table; Becker No. 2 Vert.; Ohio No. 24 Plain; Rockford No. 0 Plain; Becker No. 4 Vert.; B & S No. 12 Mfg. Type; Becker No. 5 Plain

THREAD MILLERS—Smalley General No. 23-A; Moline No. 10

PLANERS—Pond 32"x34"x10'; Sellers 36x36x12'; Pease 26"x26"x9'; Cincinnati 36" x36"x10' 2 Hds.

PIPE MACH.—Williams 6" cap.; Oster 6"

PUNCH PRESSES — Ferracute No. P-4; Barouth No. 3 & No. 4 O.B.I.; Bliss No. 62; Toledo No. 31 & No. 32; Fer. No. EGF 52 Coining; Swaine No. 38 arch; Cons. No. 24 Blanking; Walsh No. 3 O.B.I.; Bliss No. 19½ O.B.I.

SAWS (HACK)—Atkins 8x8"; Racine 6x6"

SHAPERS—S & M, G & E, Ohio, Mi., O. City, Davis, Ohio & G & E 20"; S & M, O. City, Rock., Cin. 24"; Ohio 26"; Cin. 24" s. p. gr. box; American 24" heavy, b.g. Amer. 15"; Springf. 15"; S.&M. 26", b.g. G. & E. 24", s.p., gearbox; Amer. 20"; Rockf. 24" gearbox

SCREW MACHINES—8 Hand; Gridley 4-sp. ¾"; Natl. Acme No. 52

SQUARE SHEAR—Ohl 8' 14-ga.

SLOTTER—Barr 12"; Betts 6" stroke; Niles 12"

TAPPING MACHINES—(2) Garvin No. 2 & 2X Vertical Automatic & Garvin No. 1.

TURRET LATHES—Baush 30" M.D. Vert.; Potter & Johnston, 8½x16 No. 10; Libby 24", m.d.; P. & W. 2¼" hole grd. hd.; Greenlee 2¼x26; Brown & Sharpe No. 4; Gisholt 26"; Colburn 30" Vert.

Above is only a small part of our large stock on hand

McDonald MACHINERY CO.
1531-35 N. Broadway ST. LOUIS, MO.

NEED GOOD TOOLS? — SEE US FIRST

D-31 Fox multiple drill, rectangular head, 16"x31½" spindle centers. No. 2 Morse taper; 10 spindles, hand and power feed to head.

AUTOMATICS, 5½ Model A Cleveland; ⅝-½ & ⅞" Model B

DIES and MACHINES for rect. cans, inc. 61 Ams flanger; 72 Ams double seamer; 126CD Adriance double seamer; 281 Adriance gang slitter; No. 114 Adriance Automatic Double Seamer 10" round cans.

DRILLS, 36" Cincinnati, back geared sliding head, tapping attachment; No. 4 Quint six spindle turret drill; No. 4 Morse tapers

DROP HAMMER, 300 lb. Standard Auto.

ENGINE LATHES, 22"x10' Davis dble. back gear quick change; 14" 8' Monarch, plain change; Four 9"x20" Porter Cable Production lathes with back facing attachment.

GRINDER, 12x36 Modern Self Cont. Plain

MILLING MACHINES, No. 3½ Pratt & Whitney duplex, 60" table, 27" extreme between spindles; No. 1 Newton slab, 65" table feed.

TURRET & MONITOR LATHES, 1 3"x36" Jones & Lamson: No. 1 Am. Tool & Mach., Fox Monitor chasing bar.

PLANERS, 24"x6' Pond, one head

PIPE MACHINES, 3" Bignall & Keeler; 4" Saunders; both belt drive.

PRESS, No. EG 52 Ferracute embossing press

SAND BLAST, C-36 New Haven 36"x44" Radial Sand Blast Barrel M.D.

SEPARATOR, Large Oil Separator, with hoist; 3 McKenzie chip production

WIRE STRAIGHTENER, ¼" Shuster, 10 ft. Cutoff

Many other tools—exceptional "buys"—write for full details.

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Established 1894

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No. 2 BROWN & SHARPE Wire Fd. Hand Screw Machines (3)

No. 1 BROWN & SHARPE HAND Screw Machine

1¼" CLEVELAND Model A Automatic Screw Machine

1½" CLEVELAND Model A Automatic Screw Machine

⅞" CLEVELAND Model A Automatic Screw Machines (4)

2¼" Gridley Single-Spindle Automatic Screw Machines (2)

3¼" GRIDLEY Single-Spindle Automatic Screw Machines (10)

2" Capacity PRATT & WHITNEY Turret Lathe

1½" Capacity PRATT & WHITNEY Turret Lathe

MISCELLANEOUS

3' CINCINNATI-BICKFORD Radial Drill, Motor Driven

No. 2 VAN NORMAN Duplex Miller

No. 3 BROWN & SHARPE Universal Grinders (2)

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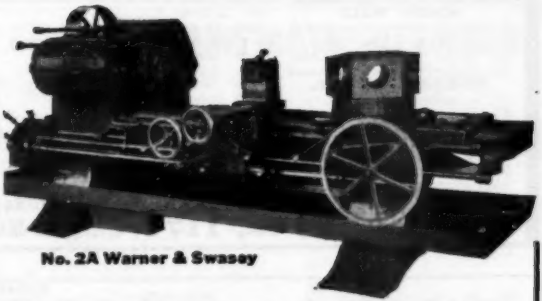

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8'—18 ga. Chicago Steel, New

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Hisey Wolf No. 26 Electric 1" $42.50
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Radial, Sens. 3 ft. American
Radial, 3 ft. Fosdick
No. 3 Baush, 20-spdl.
Rail, No. 2 Foote-Burt 4-spindle
Prentice, 4-spdl. high-speed
Allen BB Type B sgl. spdl.
Allen 3-spdl., BB., cap. 1"
Dwight-Slate 7 Spdl. 1" cap.
Barr, 4 Spdl. 1" capacity
Deuco DAH 1½" bb. M.D.
14" U. S. $35.00
20" Barnes B. G. & P. F.
20" Barnes, camel-back
24" Sibley & Ware B. G. & P.F.
25" Bickford, sl. hd. BG & PF
28" Hamilton sl. hd. BG & PF.

GRINDERS:
Disc, No. 6-20 Besly Dbl. Spdl.
Disc, No. 220 Badger & press
Drill, New Yankee, D.E.
Elec., Hisey-Wolf 3-6 BOA BB
Flex. shaft, RA 5 Haskins
Emery, DE, Norton 24"
Emery, DE St. Louis 18"&20"
Internal, Madison:
Surface, No. 1 La Salle.
Tool Post, U.S. Style HA $47.50
Wet tool, Springfield, 27" wheel

LATHES:
26"x14' Niles, PCG
22"x10' Whitcomb-Blaisdell
20"x8' LeBlond QCG, DBG
20"x8' Bradford, PCG MD.
18"x8' Hahn & Mayer PCG
16"x8' Fay & Scott QCG
14"x6' Rumsey, PCG
10"x42" Atlas, bench type, No. H-42, 1/3 HP. 110 V motor

LATHES—Turret:
2x24" Jones & Lamson
12" Reed-Prentice BG

PRESSES:
Arbor, Famco and Atlas.
Arch, Bliss 5A, Geared. M.D.
Cam Drawing, 69-N Bliss
Foot, Famco and No. 4 Swaine
No. 51 Swaine, Straight Bk. (2)
No. 2 L & J, O.B.I., New (2)
Punch, No. 5 Bliss Stiles
No. 20 Excelsior ¼" in ¼"

PUNCHES & SHEARS:
SE, Cleveland C ¾ in ¾", 26" thr.
SE W-W 14½, 25" thr. 1 in 1"
Rock River L, 24" thr. ¾ in ¼"
DE 110 Badger ¼ in ¼", 10" thr.

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Band metal 14" Racine
Cold, Higley, 20" saw, No. 17
Cold, Higley, 18" saw, No. 14
Hack, No. 3 Robertson 6x6"
Hack, No. 14 Atkins 6x6"
Wells No. 5 & 8, Band, Metal new

SHAPERS:
16" Davis, sgl. pulley drive
20" Smith & Mills
26" Hendy planer type dr.

SHEARS:
Dbl. action, No. 11 Excelsior, inside cutting, cap. 12 ga.
Rotary Bevel, Lennox ¾"
Slitting, Rotary Niag., cap. ¼" Throat 16"
Square, 36"x18 ga. Pexto Foot, New (3)
Square, 30"x18 ga. Ditto
No. 254 Pexto 30" Gang Slitting 20 ga.
No. 1236 Libert, 12 ga. 36" throat M.D. (New)
Throatless, 18 H Marshalltown

THREADERS, Pipe & Bolt:
Murchey, 3" dbl. head, bolt
Pipe, 2" Oster No. 302
Pipe, 4" 2-A Williams

MISCELLANEOUS:
Bender, No. 15 Wallace, 1" cap.
Dbl. Seamer, Swaine, 36" cap.
Compressor, Herron-Bury CCB, 14x9x8", 6' tank, 20 HP mtr.
Gear Cutter, No. 3 B. & S. 26"
Hammer, 50-lb. Little Giant.
Jacks, Lever Lift, 15 ton J. C.
Miller, Becker No. 7 Lincoln
Planer, 30"x30"x8' Wheeler
Roll, Corrugating, 10" Robinson
Screw Mach., No. 2 J. & L.
Welders 2½, 5, 7½, 10 K W Dyer spot
Valve Refacer, ¼" Black & Decker

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3" Bar, Floor type-cross tbl.
4" Bar Niles, Knee type
34" Glsh., 1 Hd. Rap. Trav.
52" Rodgers Vertical 1 head

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5A Lees-Bradner S.P.D.
6", 11", & 18" Gleason gr.
28" Rhenania

LATHES
3½x60 Fitchb.; Lo-Sw. S.P.D.
9" Sundstrand Prod. S.P.D.
14x6 Monarch, QCG Gr. Hd.
18x8 LeBlond L.C.G.
18x10 South-B, Q.C.G. T.A.
24x8 Sch-Boye, Q.C.G. T.A.
24x12 Sch. Boye Q.C.G. Tap. Att.
27x18" Bridgeford—cone
34x12 Pond L.C.G.

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48" Newton Vertical Double Spindle Rotary, M.D.
24x7½x18 Oesterlein, M.D.
Chicago & Whitney Hand
No. 21 Garvin, Cone Dr.

PRESSES
No. 23 Bliss Cons. Horn, md.
Nos. 51 & 52 Ferra. stiles

TURRET LATHES
No. 2 W & S. Saddle type,
No. 9 Foster, 3¼" hole P.F.
No. 2A Warner & Swasey Univ. SPD, MD., 3¼" hole

MISCELLANEOUS
Metal Saw: No. 8 Marvel
Broaches: V18 Amer.
1 & 2 Spindle LaPointe
Grinders: 18" to 30" Disc.

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Segal Machinery Co., 117 S. Clinton St., Chicago, Ill.

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No. 1½ Cincinnati Universal, cone
No. 1B Brown & Sharpe Plain, s.p.
No. 2 Brown & Sharpe Plain, cone
No. 3 Becker Plain, cone
Hardinge Precision Bench Type
No. 4B Becker Vertical, rotary table
No. 3 Becker Vertical

LATHES
2—Porter Cable, s.p.
20"x12' L&S 12 speed, g.b., m.d., t.s.
24"x10' L&S, cone, t.s., m.d.
20"x18' L&S, cone, t.s., m.d.
18"x10' Lodge & Shipley, cone, t.s.
14"x6' Monarch Q.C.G.
16"x36"x12' Fay & Scott Gap

RADIAL DRILLS
3½' American Triple Purpose, m.d.
3' Morris, G.B., m.d.

TURRET LATHES
2½"x26" Pratt & Whitney, g.h.
3"x36" Jones & Lamson, g.h.
30" Warner & Swasey Vertical
No. 4, No. 6 Warner & Swasey
No. 3, No. 4, & No. 7 Bardons & Oliver
No. 6 Brown & Sharpe
2½" Acme

AUTOMATICS
No. 55 Nat'l. Acme, 4 spindle

SHAPERS
24", 28" Gould & Eberhardt, s.p., m.d.
25" Davis, s.p., m.d.

GRINDERS
16"x48" Landis, self contained

Capitol Machinery Exchange 1342 Atlantic Ave., Brooklyn, N. Y.

GRINDERS
No. 2 Diamond 12"x36" Auto. Surf. Pwr. feeds
No. 1 LeBlond & Cin. T & C
16"x48" Landis, c/s self. c.
No. 3 Univ. D&K, Tool, Cut.

LATHES
(2) 1" Hardinge Prec. Tur.
16x8 & 18x10 South Bend
(2) 15x6' Rockford, Q.C.G.
(2) 17x9 Sidney, Q.C.G.
20x10 Walcott, Q.C.G.
22x11 Cisco Q.C.G. M.D.

MILLING MACHINES
No. 3 Rock. Prec. Hand
No. 1½ B & S Univ., Compl.
No. 1½B, K. & T. dble. ov.
No. 2 Becker, vert. pwr. fd.
No. 2 K & T Plain, Compl.
½ Van Norman M.D.

SCREW MACHINES
No. 0 Foster, bar feed, col.
No. 1 Foster, bar feed, col.
No. 1 B. & S. semi-automatic collets die heads
24" Steinle, Univ., 4½" hole
1-5/16" Cleve, auto. Mod. A
No. 7 B & O, Bar Feed
1¼" Smur Kaman, compl.

MISCELLANEOUS
Brake 5' D&K 14 ga., cap.
Radial Drill, 3' Gang, T.A.
6"Victor Pipe Mach., Dies
Planer, 36"x36"x10' N.B.P.
Keyseater, No. 0 Baker 1"
Shapers: 7" to 24"
Shear, 42" Pexto Power
No. 2 LaPointe Broach
No. 2 Hilles & Jones Punch

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42" Niles Vert. Gr. Box, SPD.
60" Colburn M.D.

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Avey Bch. Type H.S.B.B. (10)
20" Champion, B.G.
Bausch Multiple,
4 Spindle Barnes Camel-Back, All Geared, self oiling
No. 23 Foote-Burt High Duty

GRINDERS
6x32 Norton (2)
8x30 Fitchburg
12x36 Cincinnati plain
No. 78 W & M Surface

HACK SAWS
Nos. 1 & 2 Marvel, S.P.D.
No. 3 & 7 Atkins, S.P.D.
6"x6" Peerless Shaping M.D.
13x13 Peerless Shaping M.D.

LATHES
16"x6' American, Q.C.G.
16"x8' Bradford Grd. Hd, MD.
16"x8' South Bend
8" Sundstrand Stub
18"x8' Monarch M.D.
18"x8' W & B. Grd. Head
19"x14' Oliver Q.C.G.
24"x8' S.B.E. Q.C.G.
24"x18' Lodge & Davis
21" LeBlond Prod.
26"x16' Bridgeford
27"x16' Lodge & Shipley, MD.

MILLING MACHINES
No. 1M Cincinnati Pl. M.D.
No. 1 Cleveland Univ. M.D.
48" Newton Rotary 2 Sp. MD.
No. AB2 Becker Vertical
No. 6 Becker Vertical
2B K & T Plain M.D.
No. 2J LeBlond, Plain
New No. 4 Burke M.D. Bench
Melling Mill-Matic, M.D.
6x48 Pratt & Whitney thread
No. 4 Lees Bradner Thread
No. 23 Smalley Gen. Thrd. (2)

PRESSES
No. 13 Niagara Horn.
No. 1 Walsh O.B.I.
No. 1 Rockford O.B.I.
42P Toledo Horn.
90B Toledo Dble. Crank

GEAR HOBBERS
No. 12 B.-C. Double Overarm
No. 12 B.-C. Single Overarm
5A Lees Bradner

RADIAL DRILLS
3' Fosdick M.D.
4½' American Sensitive, M.D.
4' Ryerson, S.P.D.

BENDING ROLLS
4' Rock River, M.D.
6' Rock River, M.D.

SHAPERS
3½" Rhodes Slotter
16" Queen City, M.D.
24" Steptoe, S.P.D.
28" American S.P.D.

SHEARS
No. 636 Niagara 3/16" cap.

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No. 6 Warner & S. bar feed
No. 7 Bardons & Oliver
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No. 3 S & K Hand
No. 2A W. & S. S.P.D.

WELDERS
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Spot Welder 9 KW, AEF M.D.

MISCELLANEOUS
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No. 5 Thiel Pil. Mch., M.D.
Wire Strgn. ¼" Shuster M.D.
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No. 103 Grant Spinners, m.d.
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⅞" Cleve. s. sp. Mod. B Grd. Hd.
4" Cleve. s. sp.
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No. 5 A Potter and Johnston

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No. 14 Gardner Disc Grinder
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No. 1½ Duplex Miller
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12"x72" Landis Plain Cylindrical
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8-spindle Natco Multiple Spindle
6-spindle National Acme Horizontal
4-spindle Edlund B.B. High Speed
Leland Gif. & Avey 1 Spdle. B.B. Hi Speed

MISCELLANEOUS

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GEAR CUTTER, 72" Ruesch
KEYSEATER, No. 3A Mitts & Merrill

SUN MACHINERY COMPANY, INC.
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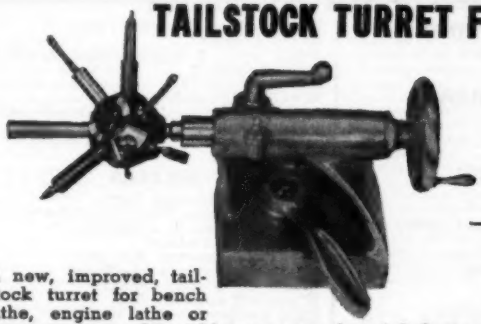
TAILSTOCK TURRET FOR LATHES



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(See page 312—special advertisement)
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No. 5 Springfield Planer Surface
No. 2—18" Gardner Disc
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36"x36"x18' Cincinnati
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48"x48"x12' Gray, Reversing M.D.

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No. 58 Toledo Nosing.
No. 42½ Pels Beam Shear
Type C Cleveland Punch & Shear

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21" Gisholt, 3¾" H.S.
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6½' Avey Metal Bandsaw

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645 W. WASHINGTON BOULEVARD, CHICAGO

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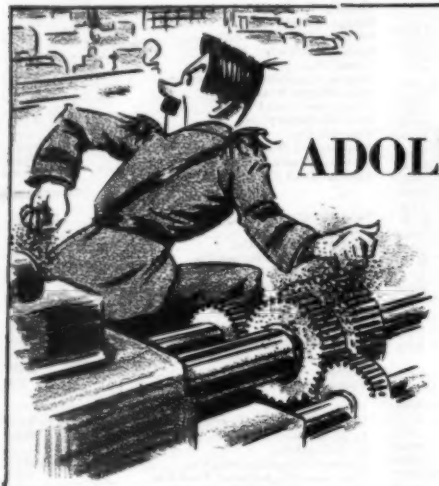

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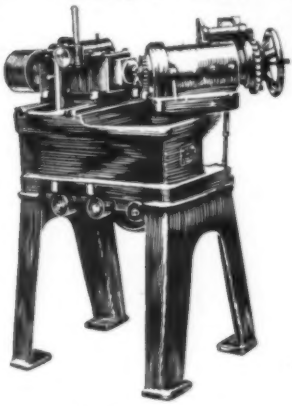
The Cincinnati Electrical Tool Co.

DIVISION OF THE R. K. LE BLOND MACHINE TOOL CO., CINCINNATI, OHIO

2701-21 MADISN RD.

Lipe Gear Chamfering Machine, 1910 Model



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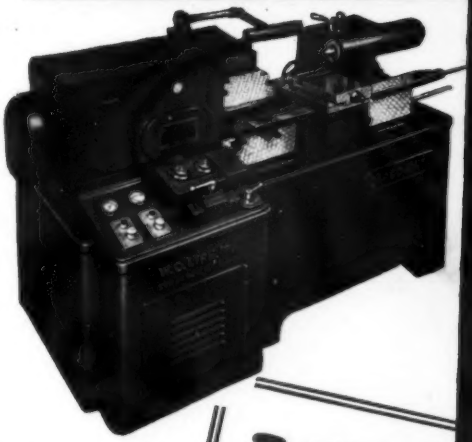

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It is super-powered for rapid turning of tough armament alloys . . . and super-rigid to end tool chatter, to reduce tool breakage and wear, and to eliminate the deflection that causes out-of-round and out-of-true.

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